your computer

December 1985

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YOUR MICRO

SPLITTING CHIPS
THE MULTI-USER ALTERNATIVE

CHRISTMAS
SHOPPING GUIDE
WHAT TO BUY
YOUR WORST ENEMY,
FRIEND, BOSS, BUSINESS, BABY,
GRANNY, SPOUSE, SECRETARY . . .

SYSTEM 8/16

CONTENTS

What the experts think about Labtam Computers

KARL REED, Lecturer in Computer Science at Royal Melbourne Institute of Technology.

"There are a number of reasons why a multi-user 8086 is a good product. The most important is that small business can have several people who need access to the same database and application, and this cannot be achieved in a practical fashion by a collection of PCs or other micro-computers."

"Have a look at the Labtam 3003, it's running multiple users."
"An IBM class machine running several users."
"It was clearly a multi-user desktop machine and that was something for Australia and Labtam to be proud of."

"I guess I regard the Labtam 3003 desktop as being more important than its UNIX (Labtam's) machine because it is meeting commercial needs that were obvious, and which have been missed by almost every other supplier."

From "An Essential Reed".
By Karl Reed
Extract from Computerworld,
May 31 1985.

Labtam Series 3000 multiple user computer systems in 8, 16 or 32 bit configurations built for personal/ micro/ and mainframe computer applications.

EDITORIAL

Australian Software Developers

Yesterday, over lunch, I heard Karl Reed address an Australian Computer Society gathering on the topic of the future of Australia's software industry. The occasion was the first meeting of the New South Wales Branch of the ACS Software Industry Association, an organisation which aims to further the interests of Australian software developers.

There are other organisations representing the varied interests which constitute the computing industry in Australia, but they all ignore, or are unable to deal with, a fundamental fact about our industry: all good ideas, all good products, start with a bright idea in the mind of one person.

The really great products, the ones which will earn Australia export dollars, will not be designed by committees and implemented by teams of programmers. They will, instead, be the product of one person pursuing an idea; a super-programmer, perhaps, or at the most a very small team of two or three.

Larger teams don't produce such singular products, except with the application of vast amounts of money, and even then success is far from certain. Large amounts of money are hard to find in Australia.

The problem which faces governments, both State and Federal, is how to encourage these people. You see, they tend to be single-minded in their approach: head down, tail up, spending every day cutting code, working toward the completed product. If they're not single-minded, almost blinkered, in their approach (they reason), they'll never finish the product.

Make no mistake, applying for government funding is a major exercise, in terms of both time and money. The preparation of a proposal is sufficiently complex and costly that the best way to get it done is to hire a consultant who specialises in grant applications. When the grant does come through, it probably won't cover the cost of the consultant plus the lost development/programming time.

It is easy to say that if software developers lack the business nous to obtain contacts and funding, then they probably wouldn't succeed anyway. Perhaps there's an element of truth in that, but it misses the point. Opportunities are being lost, and quite possibly the Australian R & D dollar is being badly invested. Just as a small software house with a potentially brilliant product has probably not taken advantage of the assistance available, the chances are that somewhere there's an organisation with plenty of business 'smarts' and the ability to put together a slick and attractive application for funding, but which probably has, at best, a very ordinary product.

The ACS-SIA holds great promise as being the first organisation which appeals to, and can do something for, smaller developers. The membership fee is low enough for small companies, the SIA policies look as though they will benefit the smaller software houses, and the Association appears to be interested in their concerns.

I urge all readers who are consultants, run software houses or are developing the latest 1-2-3 in their spare time to contact the National Chairman, Karl Reed, ACS-SIA, Department of Computing, RMIT, 124 La Trobe Street, Mebourne 3000, for further details.

LES BELL

I-POST, U-POST, WE'LL ALL POST WITH E-POST

ELECTRONIC MAIL has arrived with a vengeance, with the introduction at the end of October of Australia Post's E-Post service. E-Post is one of the most advanced electronic messaging networks in the world, offering an easy way to send mail with assured (according to Australia Post) delivery times.

Letters can be sent via E-Post by phoning an E-Post operator from anywhere in Australia (with 008 local call charges), by taking a handwritten or typed draft to an Australia Post Electronic Post Centre, or by sending the text by telex. E-Post links major post offices in capital cities and regional centres with express courier bases.

The Electronic Network

The electronic mail system was adapted from a concept proposed by the consultant firm Hi Tech (Canada), and further developed and specified by an Australia Post Electronic Postal Services Department project team. The team worked closely with other consultants and with Burroughs, which was given a contract in May this year for the system's software and hardware.
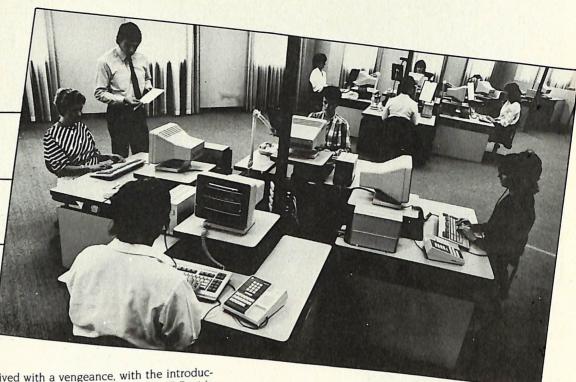
The network comprises a number of Electronic Post Centres, Electronic Mail Acceptance Centres and a Network Control Centre. All communication between centres is done through Austpac, mostly at 2400 bits per second. The application software installed at each centre was custom-written by Burroughs/Cyberware and basically consists of a communicating word processing package which allows for information from both sender and receiver, text creation, use of distribution lists, enquiries on message status, and message transmission and reception.

The system uses the recipient's postcode and the required delivery option to select the correct destination work centre and to notify the operator of the service availability. Accounting information for the day's traffic is transmitted to the NCC for collation and billing. In case of failure at a site, the NCC will redirect traffic to an acceptable alternative centre.

EPCs, EMACS and the NCC

The initial system will consist of 56 Electronic Post Centres, three Electronic Mail Acceptance Centres and one Network Control Centre.

An EPC has two functions: draft-form text is accepted over the counter for transmission, and messages for delivery to the area served are printed. Each EPC consists of a Burroughs B26/45 standalone workstation, with 1 Mbyte of RAM, a 10 Mbyte hard disk, single floppy disk and a daisywheel printer. Those EPCs designated as Delivery Centres for express courier deliveries are equipped with two printers.

The primary task of an EMAC is to accept electronically lodged documents and enter them in the system. Lodgement is currently by telephone, telex and facsimile from EPCs. Direct electronic lodgement by account customers and through public videotex services will be phased in during 1986.

Each of the three EMACs now in use (at Dandenong in Victoria, Chatswood in New South Wales, and in Brisbane) consists of a shared resources processor and a number of B25 workstations operating in a cluster environment, with Summit telex interfaces and a phone system including local and 008 lines. Several facsimile machines are installed to receive incoming traffic from Intelpost (the international document delivery service) centres.

The Network Control Centre is located in Melbourne. Its main tasks are to provide a support facility for other centres, maintain master files, collate accounting information, co-ordinate maintenance and store delivered messages. Software updates are also released through the NCC.

Using E-Post

E-Post offers a variety of delivery options. You can send a lettergram or a letter by express delivery (two hours) or normal delivery, which will arrive by the next working day. (Remember when next-day delivery was standard for all mail? It's amazing how computers can recreate the manual efficiency of old!)

Lettergrams are basically an alternative to telegrams, with a 10-line limit. Letters may be up to two A4 pages long and are delivered on special E-Post stationery. Text may be phoned in or hand-delivered, with handwritten copy acceptable. A free confirmatory copy of each letter and lettergram is posted to the sender.

Multiple copies of a letter or lettergram can be sent as an E-Post Bulletin, saving on time and costs. Mailing lists of 1000 names can be stored by Australia Post for account customers.

What'll it cost? Charges start from $4 for a normal delivery lettergram, with an express delivery letter costing $15. More information on services and costs can be obtained from any major post office.

Future plans for E-Post include direct connection through office computer systems; development of the system to provide same-day international mail service; extension of the national network; and provision for storing customers' signatures, logos and graphics for reproduction using laser printers. □

NCR AIDS SURF CLUBS

NCR has donated an I-Series 8270 computer and software package worth $100,000 to the surf life-saving movement in New South Wales.

State SLSA administrator Ernie Davis said, "With 20,000 voluntary members and 123 clubs to co-ordinate throughout the state, we have been fighting a losing battle against an ever-increasing administrative burden."

The new computer will perform a wide variety of functions, one of which is to provide a computer-controlled register of available equipment, to enable the SLSA to deploy equipment to beaches once secluded and unused, but now being visited by literally thousands of people each summer because of the boom in land development, caravan parks and access roads.

It will also keep a register of spare parts readily available in the various SLSA clubs. This will allow clubs to provide spares to other clubs which would be otherwise left with an inoperable boat or piece of equipment.

The computer will also be used to establish a data file for each of the SLSA's 22,000 members, who must be tested yearly on their ability to perform rescues. A separate register will be kept of members who need to do re-fresher/advanced resuscitation courses, advanced life-saving test swims and training to become inflatable rescue-boat drivers.

YOUR COMPUTER'S CHRISTMAS PARTY

Our regular Synergistic Beer Drinking won't be held in January, as it falls on the first of the month, and we're not sure how many of us would make it. The December session is the first Wednesday of the month (as usual), at the Clock Hotel, 470 Crown Street Surry Hills, about 6pm.

To those of you who can't make it to the Clock, we'd like to take this opportunity to wish you a great Christmas and an exhilarating New Year. We've already been working on our collective New Year's resolutions: to eat less; to make enough money to buy an island; to spend more time re-searching for our proposed new magazine CAD — *Computer-Aided Decadence*; oh yes, and to make *Your Computer* even more useful, readable, enjoyable and engrossing.

CALL FOR GRAPHICS PAPERS

Ausgraph '86, the 4th Australia-sian computer graphics conference and exhibition, will be held in Sydney from July 7-11, 1986. This year's conference, held in Brisbane, attracted over 500 delegates — more than twice the number expected by the organisers.

"We were all delighted by the success of the Brisbane conference," said conference chairman Harry Hvistendahl, "and because next year's venue is Sydney, we expect an even bigger turnout and are preparing to cater for double the number of exhibitors and visitors."

Hvistendahl believes Ausgraph generates a special excitement because computer graphics is still a comparatively new field in Australia, and the visual impact and effects generated by the tech-nology open up all sorts of possi-bilities for professionals from many different fields.

Ausgraph '86 will be held in the Sydney Hilton Hotel, with a pub-lic exhibition in the nearby Syd-ney Town Hall. The exhibition and conference were to have shared the same venue, but the demand from exhibitors necessitated the change.

A call for papers for the confer-ence has been distributed world-wide. Areas to be covered in-clude: introduction to computer graphics, graphics standards and interfaces, graphics in mapping and exploration, computer graphics in publishing, CAD (computer-aided design) with microcomputers, input/output devices, graphics workstations, image processing, video and animation techniques, CAD with interactive graphics, business graphics and expert systems.

Papers are invited from poten-tial speakers, with a summary re-quired by January 24, 1986. Final papers, plus illustrations, should be submitted by March 1, 1986. Further information can be obtained from: Ausgraph '86 Con-ference Secretariat, PO Box 29, Parkville 3052; (03) 387 9955. □

ASHTON-TATE COMES TO TOWN

Ashton-Tate, one of the world leaders in microcomputer soft-ware sales, is opening an office in Australia with Bill Bolton as man-ager. Regular readers of *Your Com-puter* will know Bill from his in-volvement with the magazine. In addition, he has been working as product manager for Arcom Paci-fic, handling products from Ashton-Tate and other com-panies.

The Sydney office will focus on market development in Australia and New Zealand, with Ashton-Tate's sights set on gaining a lar-ger proportion of the corporate market. Bill will be concentrating on corporate support, marketing, training and establishing efficient dealer networks.

Arcom Pacific will remain the master distributor for Ashton-Tate products in Australia. These products include dBase II and III and the integrated package Framework. □

BENDIGO CAE INSTALLS THE JX

Bendigo College of Advanced Education is installing 42 of the new IBM JX computers. Two sepa-rate local area networks, each containing 16 JX personal compu-ters, will be created and used by students undertaking degree and diploma courses in a range of computer and non-computer-based subjects. The remaining 10 computers will either form a third network or operate as standalone systems.
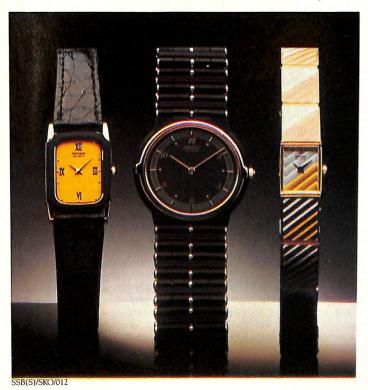
Bendigo CAE is the only col-lege in Victoria, outside the Mel-bourne metropolitan area, which offers a full-time degree course in computing. Mr Bruce Winzar, sys-tems manager of the college's ▶

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HANDS UP FOR SEIKO

Computing Services Centre, said the JX was chosen because it offers access to the largest amount of business and other software, and it would enable students to become familiar with IBM documentation and terminology, enhancing their job prospects.

All 42 IBM JX personal computers are equipped with colour screens, 256 Kbytes of memory and single 9 cm microfloppies. Ten machines have dual diskettes and two have an additional 13 cm disk. The college also ordered three IBM Personal Computers, two equipped with 20 Mbyte hard disks. JX DOS and Janet/2 will be used in the JX computers, with networking software installed in the IBM PCs. □

R:BASE FROM MICROSOFT

Microsoft Corporation and Microrim Incorporated have signed an exclusive agreement whereby Microsoft will market and distribute Microrim's R:base 5000 database for the IBM PC everywhere but North America and the Far East. The product will be labelled 'Microsoft R:base'.

Microsoft has the largest international distribution network of any independent software company and can now offer a high-end relational database product to complete its product line for the IBM PC user market.

Microrim president Kent Johnson believes the distribution agreement offers benefits for both companies: "This alliance allows us to focus our marketing efforts on the domestic marketplace and still continue to expand internationally with a very powerful partner. In return, Microsoft is able to expand its product line overseas with a highly successful database product."

R:base 5000 is currently one of the top 10 software products on the United States' Softsel Hotlist of popular products in the domestic market. □

NETCOMM'S 300 TO 2400 BPS MODEM

Netcomm Australia has been doing interesting things with modems for some time. Its PC In-modem won the Australian Hardware commendation in *Your Com-*

puter's Computer of the Year Awards this year. Now, the company has produced what it claims to be the first modem to provide the complete range of transmission speeds from 300 bps to 2400 bps.

According to Netcomm chairman Chris Howells, the Smartmodem 1234 is the first single-unit modem to combine the different chip technologies previously used to meet everyday low-speed operational needs and the superfast requirements of major business.

Netcomm has also announced the Smartmodem 123, which supports 300 bps CCITT full-duplex, 1200/75 Viatel transmission and 1200 bps full-duplex communication. Both modems are Hayes-compatible and include auto-dial, auto-answer and auto-disconnect facilities.

With the introduction of the new modems, Netcomm has announced price reductions on its other modems. The PC In-Modem now costs $595 (tax exclusive) with bundled videotex software; the Smartmodem 1200 is $900; and the Smartmodem 2400 is $1260. The new modems will cost $1900 for the 1234 SA (synchronous/asynchronous); $1810 for the 1234 A; $1575 for the 123 SA and $1485 for the 123 A. Netcomm can be contacted on (02) 888 5533. □

THE CHEAPEST COMPATIBLE, FROM DSE

Dick Smith Electronics has extended its family of microcomputers with the introduction of the DSE Multitech, an IBM compatible with a price tag which will put it within the reach of many home users.

Multitech is a Taiwanese company which originally planned to market the machine itself in Australia. With DSE on the prowl for a cheap IBM clone, the two joined forces to get the Multitech on the market before Christmas.

The DSE Multitech is available in three configurations, each with an RS232 serial port, RGB and composite video outputs, real-time clock/calendar with battery backup, sound circuitry, 84-key keyboard and a parallel port. The System One has 128 Kbytes of

RAM, one 360 Kbyte floppy disk drive, one expansion slot, MS-DOS 2.11 and three months' warranty. It costs $1395, although you'll have to add the cost of a monitor of some sort, unless you already have one lying around.

The System Two has an additional floppy disk and 128 Kbytes of RAM, and Micropro's *Easy* word processing package. Included in the price of $1995 is six months' on-site service — an indication of DSE's confidence in the short-term reliability of the machine.

The System Three is a single-floppy, 10 Mbyte hard disk system (with no expansion slot available). An integrated software package, *Aura*, is bundled with the system, and the on-site service agreement is included. This system is priced at $3995.

DSE claims the Multitech is "as compatible as can be". According to company spokespeople, they've tried all the usual software tests for compatibility, including Flight Simulator and Pro-loked programs, and they all run just fine. If they perform well (and we'll have a review appearing soon), they'll be hard systems to beat for value. □

TALLGRASS LOPS ITS PRICES

Tallgrass Technologies Australia, a supplier of mass storage systems for PCs, has announced price reductions of up to $700 on three major products.

The products affected are the 60 Mbyte tape drive unit, reduced from $3200 to $2990; the 25 Mbyte external disk/tape unit, down to $5095 from $5695; and the 80 Mbyte external disk/tape unit, reduced from $11,450 to $10,750.

Tallgrass's general manager, David Marchioni, said improved production in the United States has enabled the company to reduce prices, despite this year's fall in the value of the Australian dollar. □

CHINA PREFERS NORTHSTAR

US microcomputer manufacturer Northstar Computers has become the first preferred 8-bit microcomputer supplier to the Chinese government. The company has also entered into discussions with the Chinese gov-

ernment about a joint manufacturing facility in China for the Northstar Advantage.

Northstar's international director of sales, Bruce Campbell, said the Chinese were impressed with the Northstar Advantage because the company had ported its graphics packages to incorporate the Chinese character set. "It requires a very high screen resolution to be able to achieve this feat, but the Advantage incorporates this prerequisite," he added.

China constitutes about 85 per cent of the company's worldwide market for the Advantage. In Australia, Northstar's most recent success has been the Dimension, a multi-user IBM compatible, distributed by New Dimension Computers (reviewed in the February 1985 issue of *Your Computer*). Evidently the Chinese are also showing interest in this machine, because of the array of applications software available for it. □

KALGOORLIE COLLEGE RCPM

A new Remote CP/M system has been set up by the Kalgoorlie College Computing Centre. The system is available free of charge to anyone with a microcomputer and a modem.
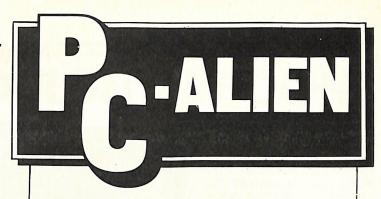
The RCPM provides a bulletin board service — enabling users to leave messages and notices on the system — and a library of public domain software. Users may upload their own programs to the system, as well as downloading programs already on the system.

The College RCPM is based on an SME single-board computer, with two 20 cm floppy disk drives and one 13 cm floppy, running under CP/M. If you want to try the system, the phone number is (090) 21 7755. □

EXPANDED MEMORY LOSS

Imagineering's support hotline has been running hot since the release of the Above Board. Evidently Symphony version 1.1 has an 'expanded memory error', which can cause large amounts of data to be lost when used in conjunction with the Above Board.

Lotus Development Corporation has already released a debugged version of Symphony, and

registered users of the program will have been notified about the fix. If you haven't registered your copy and you're wondering where your data has gone, contact Imagineering on (02) 212 1411 to get the new version. □

IT'S ALL IN YOUR HEAD

Repetitive Strain Injury (RSI) is a neurosis! Well, it is according to Dr Yolande Lucire, a Sydney psychiatrist and specialist in medico-legal work. In an address to an occupational health seminar, she suggested employees who produce medical certificates for RSI should be sent to another doctor for counselling.

Dr Lucire recommends employers should contact insurance companies to put them in touch with doctors who see over-use as developing from a neurosis (fascinating how insurance companies have such lists, isn't it?). According to the industry newsletter, *Occupational Health*, insurers are currently facing 20,000 overuse injury claims, making it a very costly problem.
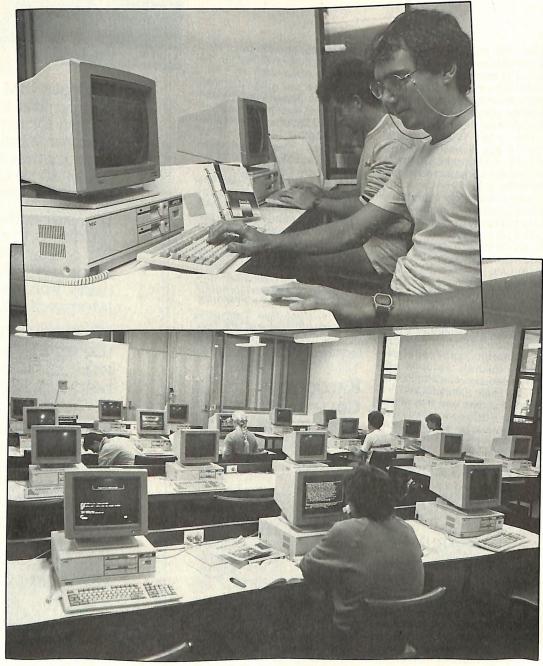
Fortunately for the sufferers, Dr Lucire has yet to persuade the courts of the validity of her diagnosis, with her evidence being rejected in two recent cases in Queensland, where compensation was awarded to the incapacitated workers. □

CALYPSO JANE CIRCUITS

In the mammoth effort to compile our 'Software on the Cheap' listings (*Your Computer*, June, August and September) we managed to make a mistake on the offerings from Calypso Jane Software.

The DC Circuits Kit was listed under CP/M software; it is, in fact, available only on the Apple II+, IIe and IIc computers. The kit contains: a class set of instruction cards, covering topics such as conductors and insulators, circuit symbols and diagrams, electrical safety, voltmeters, parallel circuits and switches; a teacher's manual; and a disk containing games, interactive programs and quizzes.

The price is $80, which includes delivery and after-sales service. For more information, contact: Suzanne Savage, Calypso Jane

Software, PO Box 160, St Peters 2044; (02) 516 1247. □

NEC MUSCLES IN ON EDUCATION SCENE

NEC Information Systems Australia has broken the Sperry/IBM domination of the Queensland education market with its recent tender for equipment and software at the Capricornia Institute of Advanced Education in Rockhampton.

NEC competed for the tender against 36 other computer suppliers. The initial order is for 37 dual-floppy, colour APC III personal computers, each with 256 Kbytes of RAM. A further 63 computers may be required.

The computers will be used in the Institute's teaching laboratory, especially established for users in fields not traditionally associated with computers. According to the Computer Centre Manager, Mr Ian Jenkins, first-year computer science students will familiarise themselves with computer languages, while humanities and social science students will use the laboratory to learn how to use word processing and statistical software.

Software purchased for the machines so far includes Microsoft Word, DR Logo, Supercalc 3, Acculink, statistical packages, Pascal, COBOL and FORTRAN. The Institute is at present researching the advantages of linking up with Telecom's Viatel, using the system, among other things, for listing courses and possibly even course instruction. □

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AMERICAN GRAFFITI

BY HOWARD KARTEN

FREEWARE

Since the first two cavepeople exchanged goods, perhaps swapping a pelt for food, one of the most fundamental laws of economics has been (in the United States, anyway) TANSTAAFL, or "there ain't no such thing as a free lunch". Like many other apparent laws of nature, however, this one appears to be under attack as a result of the microcomputer era. Software legitimately obtained by users free of cost is in fairly wide use in the United States; perhaps not as widely distributed as commercial hits such as Lotus 1-2-3, but nevertheless it's used by most almost every day.

Three 'freeware' programs in especially wide use for IBM micros are PC-Talk, a well-featured terminal emulator; PC-File, a database program which has received good reviews; and PC-Write, a word processor which has also been favourably reviewed. Moreover, a lot of freeware activity centres around these programs. For example, several purveyors of consumer-oriented databases distribute their wares in a format designed to be read by PC-File; and hackers are always making extensions to existing products and distributing those extensions through computer clubs, societies, public access bulletin boards, and so on.

The three aforementioned programs are distributed in the following manner: the programs and documentation are contained on unprotected disks; users are encouraged to copy these files without incurring any financial obligations. Modest 'donations', typically between $US25 and $US50, are requested only if users find they're actually using the software.

In our experience, most users actually do send in the money — often on the basis that the size of the contribution is minuscule compared with the benefits, and to support the idea of freeware and encourage other ventures.

(The author of PC-Talk reportedly netted more than $US1 million on the product, with no costs for advertising, distribution, marketing, and so on.)

Generally speaking, the two best sources of freeware are user groups and services which distribute freeware for free, both of which make only modest charges for their services (for example, for duplicating and mailing out software). The latter sometimes advertise, typically in small classified ads; the former often put notices about their freeware in club newsletters.

If you're unsure of where to find clubs and newsletters, a good way to get started is by writing to the manufacturer of your micro. Almost all manufacturers are in touch with, or have lists of, hobbyist clubs.

One of the largest freeware distributors in North America, and undoubtedly the most ambitious, is Canada Remote System of 4691 Dundas Street West, Islington, Ontario M9A 1A7. This corporation will send out, free, a 44-page catalogue describing its wares in software for CP/M, PC-DOS and MS-DOS machines. Many popular machines, including the Commodore 128 (but not the Commodore 64) and the Apple II running CP/M, are covered.

Proprietor Jud Newell explained to *Your Computer* that CRS charges approximately $6-$10 (Canadian) for each disk it sends out. The charge, Newell was careful to explain, is for the effort involved in reproducing the software, the disk itself, and postage — not for the software. In other words, Newell is adding value to the freeware by making it available to users.

Another way of getting freeware from Newell is by taking out a subscription to his system, for $35 (Canadian) year. Newell's may well be the only operation of its type to have its own hookup to a value-added (packet-switched) network! He pays for a link-up to Datapac, the Canadian packet-switched network. This means a subscriber from literally any country in the world which has a packet-switched data communications system can reach Newell's computers, and Newell reports he has several subscribers in the UK and Australia.

After paying the initial subscription fee, subscribers pay only for communications costs. The nature of the communications systems involved are such that all calls are, in effect, made collect, and are subsequently billed to the caller. Interested readers should write to Newell for further information.

Notwithstanding the excellent values represented by freeware, enthusiasts should be aware of a very significant negative aspect to freeware that has only recently become evident. One of the programs circulated to many United States sources of IBM freeware is in fact a Trojan horse. This program — which goes by several names, one of which is ARFARF — seems aimed at users of IBM's Enhanced Graphics Adaptor (EGA) hardware. What it does, however, is to erase everything from the user's hard disk! Although most BBS sysops and freeware distributors have made efforts to eliminate any such programs, they may nevertheless be around. One variant of ARFARF 'nibbles away' at small amounts of data every time it's run. Clearly, users should never entrust to freeware data or software that has not been previously backed up. TANSTAAFL.

Some other large sources of freeware in the States are:

- The Boston Computer Society, 1 Center Plaza, Boston, Massachusetts 02108. BCS is one of the oldest, largest, and most prestigious end-user-oriented groups in America. It has more than a dozen specific sub-groups — for the Atari, Commodore, IBM, and so on — many of which maintain large libraries of software.

- National Public Domain Center, 1533 Avohill, Vista, California 92083, which maintains a library of several hundred disks.

TROUBLES IN COMPUTERLAND

The American microcomputer retail chain Computerland is an important force in the United States' industry. Because of its prominence and ubiquity (820 franchisees), vendors eagerly court the chain for its shelf space and drawing power on shoppers.

Legal difficulties experienced by founder William Millard, and threatened revolts by franchisees, however, have forced major changes at this, one of the world's largest computer retailers and almost certainly the world's most profitable. Those changes could soon have a ripple effect.
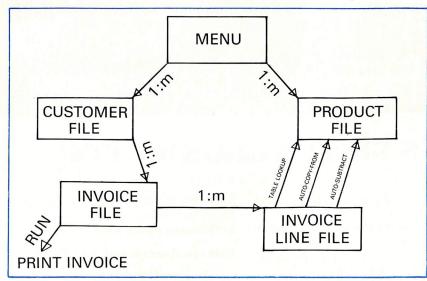
In March, founder William Millard lost a fight centring on a note that seemed to sell 20 per cent of Computerland parent IMS Associates to an investor called Micro/Vest. The seemingly arcane legal issues in the fight centred on whether the note did indeed represent 20 per cent of Computerland, and on whether it was transferable. The outcome of the legal fight was that in addition to having to give up the 20 per cent interest, Millard was socked with damages of $US141 million. Under the US legal code, Millard would have had to post a significant-sized bond merely to appeal that decision.

More recently, the company has been faced with revolts by Computerland franchisees who threatened to withhold royalty payments and perhaps terminate their contracts. The issues have been the size of the royalty payments (currently 9 per cent of sales) and other difficulties with Computerland management.

The most recent development has been the resignation of the Computerland founder and his daughter, Barbara Millard, and ▶

DO IT BETTER!

WITH Meta 5GL
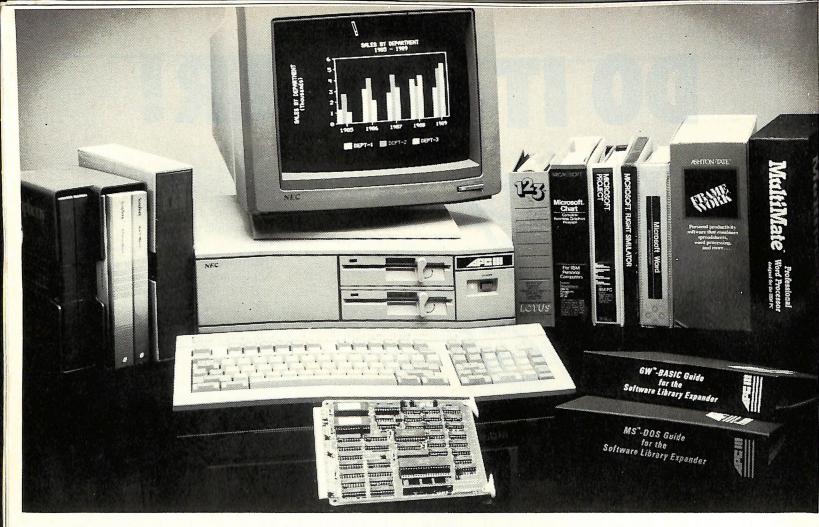
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SLE Card for unmatched software range.

The new SLE (Software Library Expander) card enables the NEC to run the world's broadest range of software. Run all the most popular industry standard packages. Lotus, Symphony, dBase III, Multimate and Crosstalk, just for starters. In most cases, they run faster than on "industry standard" PCs.

Other features include:

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☑ High resolution in colour or monochrome
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☑ Parallel port
☑ Optional 8087 maths co-processor

Stocks are limited so call now to avoid disappointment.

SLE Board and software   **$550.00**

Reduced Prices on Hard Disks

We are now able to offer unmatched low pricing on hard disk versions of the APC-III. Plus a new high speed 20 Meg hard disk. All hard disks are manufactured by NEC. They offer superior speed and reliability. Do not compare them with brands being fitted on other PCs!

New pricing on APC-III hard disk computers:

1 x 720K floppy plus 1 x 10 Meg
(Monochrome)   **$4795.00**
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For colour add $700.00

Memory Expansion to 640K

We now have a brilliant new 512K memory board. Expand the APC-III to its full 640K with just one card.

512K memory card $695.00

High speed networking for APC-III

The Novell Netware/O system is now available for the APC-III.

☑ Up to 16 APC-IIIs can be networked together, with one machine acting as a file server and print sharer for all machines.
☑ A high speed common bus allows sharing of files and peripherals.
☑ Printers may be connected to workstations or accessed via the file server. Two printers may be connected to the file sharer. Sophisticated print queuing is provided.
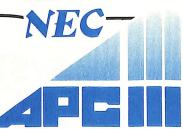☑ No disk partitions are necessary. All files and directories are shared subject to password protection.

the reinstatement of ex-president Edward Faber as president and CEO. The noises from franchisees, however, are that the last byte has not yet been processed in this fight.

SELF-EMPLOYED JOBS

Apple founder (and still largest shareholder) Steve Jobs left the company in mid-September to form his own company, and could conceivably wind up competing with Apple. Over the years, industry observers have come to accept the idea that most Apple-related announcements will be accompanied by considerable press hoopla, and this one was no exception. Indeed, the news of Jobs' apparent spat with Apple president John Sculley and his board of directors overshadowed a raft of product announcements made the same day; that was only one of several developments that strained relations between Jobs and the board.

It had all started seemingly innocently enough back in June, when Jobs was relieved of much day-to-day responsibility by Apple president Sculley — whom Jobs had recruited. Jobs subsequently went on vacation — out of touch with company goings-on — and pondered his future plans.

Apparently, they included a new company, and Jobs recruited five employees then at Apple — including some who were key forces in the design of the Macintosh. The Apple board may or may not have asked to invest in Jobs' new venture — there is some disagreement on the specifics and timing — but the outcome was that it turned on Jobs and threatened to sue him over several issues. There were charges and countercharges — the press was eagerly courted, and used, by both sides — and Jobs has now severed his ties (except for own-

ing stock) with Apple. The whole affair even made the cover of the American magazine *Newsweek* — which ignores most business developments.

Jobs has said he will concentrate on developing a microcomputer targeted at universities.

CLOUDY FUTURE FOR GEM

Digital Research Inc (Bellevue, Washington) will cease selling the Graphics Environment Manager (GEM) as of November 15. DRI signed an agreement with Apple Computer after that company threatened to sue on the ground that GEM infringes on Apple patents for the Macintosh visual interface. DRI hopes to replace the current GEM with a new version that performs the same functions, but appears less Macintosh-like.

The agreement could have far-reaching effects. Atari, for example, licensed GEM for use in the Atari 520 ST, as have other software vendors.

SOME CHRISTMAS SUGGESTIONS

It's not easy to come up with unique suggestions for Christmas gifts for computer users which will be appreciated and used. A high rate of product introduction and obsolescence in this business makes computer users a very jaded bunch, which makes it even more difficult to find good gifts.

Nevertheless, we've managed to come up with some ideas for unique gifts for PC users which will say 'Merry Christmas' the year round. All the items listed below run on all commonly-used micros:

1. *You're Okay, Your Computer's Okay.* This 'personal development software' has been quietly gaining a fabulous underground reputation among software cognoscenti for the past six months; it's

now being distributed nationally. Using heuristic programming techniques, it candidly assesses your strengths and weaknesses, and then ignores the latter and periodically displays complimentary, reinforcing platitudes on your CRT. It costs $US8.99 and is available from Good News Enterprises, Box 700, Virginia Beach, VA 23463.

2. Computerists with an entrepreneurial bent will be delighted to find a copy of *How to use Artificial Intelligence to Make a Fortune in your Spare Time* under their tree. This recently published work discusses all the truly important parts of the artificial intelligence business: how to set up an impressive demonstration to extract funds from investors, how to dazzle the press with demos, projections, and scenarios (with an appendix on calming sceptical readers who get nightmares instead of beatific visions), how to pick a company name, and many other practical suggestions. At $750 (comes gift-wrapped) it's from Nostrum Press, Box 711, Reno, Nev.

3. *The Extractor* is the perfect gift for the special someone on your list who's drowning under the weight of all that computer news. This gift combines character recognition hardware that reads all type fonts with artificially intelligent software that extracts computer news and feature articles, summarises them to their most concentrated form, and saves it all in a database. Guaranteed to save users at least four hours a day of reading, and to end messy office, living room and night-table clutter from clipped-but-unread articles. A mere $25,000 will secure a copy from Timesaver Products, 85 Blue Sky Lane, Cambridge, MA 02139.

4. That special businessperson on your list will appreciate *The Hyperdimensional Project Scheduler*. This unbelievable project management system can schedule pro-

jects so engineering has another two years to complete the product, production will simultaneously have six months' lead time to retool, and sales will be able to get the product into the field next week — and leave all departments feeling happy with the schedule. The $22,500 price includes postage and handling, as well as a lengthy off-site, post-implementation review session for users who find themselves in hotter water. From Modern Business Enterprises, 75 Wishful Vista Lane, Buena Vista, Calif.

5. The same vendor also offers *The Business Report Writer*. This ultra-sophisticated word processor can compare progress reports with original schedule projections and automatically reword reports of serious slippages. Another feature is the sentence checker, which flags sentences containing 'bad news' and automatically rewrites them to downplay or disguise that bad news. Also, a syntax/usage checker insures you have used cliches and power words appropriate to your company's culture, image, and line of business. Finally, an optional module lets you analyse the boss's memos and extract the proper cliches and metaphors for replay in your memos to him. (This program is also available as a stripped-down vertical market product for lawyers, theologians, programmers, and others who can do without features such as the schedule-slippage comparator.)

6. *The Decision Maker*. This package combines highly sophisticated database access, statistical projection and graphics capabilities to weigh alternative scenarios used in major decision-making such as strategic planning. With a few keystrokes from the user, it automatically generates the decision the boss wanted you to make in the first place.

Merry Christmas, y'all. □

GROUP MICROS

Les Bell looks under the cover of multi-user microcomputers to see how they tick, and whether they tick better than standalone PCs.

■

Why on earth would anyone want a multi-user microcomputer? You may well wonder. Isn't the whole idea behind PCs that you can have the thing to yourself, with no danger of interfering with other users, with the full processor power available to you alone? And if you do need to communicate in some way with other users, surely that's what networks are for?

Well, yes and no. PCs are small, self-contained systems, but often they are simply too self-contained, with little ability to share files and with lots of redundant hardware for each user. Multi-user micros — like minicomputers — are better at file sharing as well as at sharing some peripherals such as disk drives and printers.
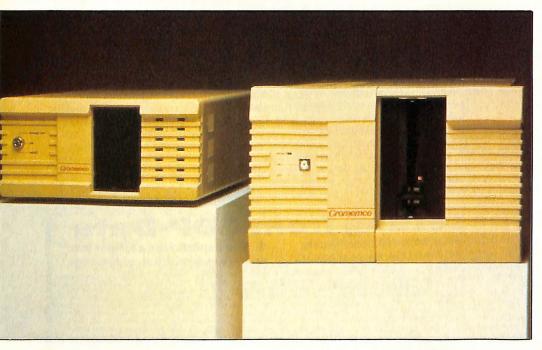
Networks work well in some situations, but not all, and in practice some of their advantages have disappeared. For example, network interface cards are usually more expensive than PC hard disks, so the idea of sharing 'expensive' hard disks across a network has flown out of the window.

While a network allows sharing of some critical resources, multi-user systems take the reverse approach and basically share everything, only duplicating the minimum necessary to support a user. In the right situations, multi-user systems can offer considerably higher performance at much lower cost than networks or standalone PCs. In order to see why, we need to understand how multi-user systems work.

How They Work

The first thing not obvious to most PC users is how a single computer can run multiple programs simultaneously. There are two techniques which allow this. The first is to have multiple processors inside the machine, each running a single program. This is known as multi-processor

Cromemco's X-series, and it's dazzling bit-image graphics — one of the specialist uses for high-power multi-user machines.

architecture; each processor has its own memory and I/O, and some kind of high-speed network is required to allow sharing of the disk drives and other common resources. This is really a local area network system in a single box.

The alternative is a technique called time-slicing or time-sharing. This allows a single processor to apparently run multiple programs by switching its attention to each for a few milliseconds at a time. So for, say, 20 milliseconds, program A is run; then the processor is interrupted, the contents of its registers saved and the registers reloaded with the contents of program B; execution continues on program B for 20 milliseconds, before the process is repeated, perhaps with program C or program A.

This time-slicing depends on a combination of hardware and software. The hardware requires a real-time clock which can provide a 'system tick' interrupt every 20 milliseconds or so, to interrupt each program in turn. And the interrupt handler must connect to a piece of software called the despatcher, which saves and reloads the registers and generally supervises the switchover process.

If the processor continually runs program A, then B, C and D and then A again, repeating the same cycle periodically, this is called time-sharing or round-robin scheduling. Every program gets an equal slice of the available time, whether it needs it or not. In practice, this extremely simplistic approach is hardly ever used.

The despatcher connects to another program called the scheduler, which updates the overall system status every system tick. Some programs may have called the operating system to input a character from a terminal, and if that key has not yet been pressed, there is no point in running such programs, they can't do anything.

To avoid wasting time trying to run programs that can't proceed, the operating system must keep track of each program's status. Those which are waiting for some outside resource — like a disk transfer or terminal keystroke — are placed on a wait list and taken off the list of programs which are ready to run. Whenever a keystroke arrives for a waiting program, it is taken off the 'wait' list, placed onto the 'ready' list, and will then get its turn of processor time.

High-end multi-users: DEC's Microvax (top and middle), and the Wicat range of 68000-series machines.

This process can be further extended by giving each program a priority. When the scheduler examines the ready list, it picks off the highest priority program and runs it before any lower priority program. Programs of equal priority are rotated on a 'round-robin' basis. The only way a lower-priority program can be run is if all higher-priority programs are on the wait list.

This scheme is used by real-time operating systems because as soon as a high-priority process becomes ready to run (for example, a character arrives from the keyboard) it goes straight to the top of the ready list and will run immediately. Thus real-time systems, unlike time-shared systems, can guarantee that an external event will be responded to within a certain period of time.

Other schemes allow a program to run at equal priority with others, but getting more system ticks of processor time than others. While this will cause some programs to apparently run faster than others, they are all at the same priority, with no guarantee of real-time response. Unix, for example, is a time-sharing system, not a real-time system.

Memory Management

Given that we can share the processor between different programs, how do we split up the available memory between programs? Again, this is the responsibility of the operating system, and several different ▶

schemes are in use, each particularly suited to a different processor architecture.

The simplest memory management scheme places each program in a different area of memory and keeps them from overlapping as best it can. When a program loads from disk it asks the operating system to provide it with as much working storage as it needs and then restricts itself to that area of memory. If any more space is required, it must be obtained by requesting it from the operating system, which manages memory in much the same way as it manages the storage on a disk drive.

A table or list of memory descriptors is maintained by the operating system, giving the position and size of each block currently allocated, as well as those so far unallocated.
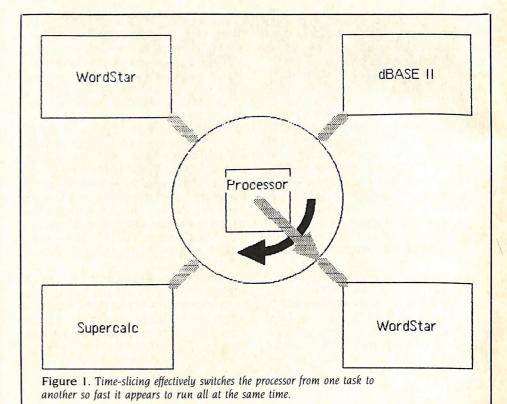
This scheme works well for machines which can manage a large, linear address space, and can also work for segmented processor architectures such as the 8086.

Some processors, however, have relatively small address space capability. The Z80, for example, can address only 64 Kbytes of memory; how then can it run multiple programs each, say, 48 Kbytes in size? The answer here is a scheme called memory bank switching. The top 16 Kbytes or so of memory, where the kernel of the operating system resides, stays fixed. However, there can be multiple banks of memory for the remaining 48 Kbytes, each of which is switched in as required.

This is how operating systems like MP/M II and Oasis are able to function in small 8-bit systems with surprising performance (not surprising that they work so well, more surprising that they work at all!). In fact, it is a similar scheme to that used by the Intel Above Board and MS-DOS 4.0, and (on a much larger scale) IBM's XA (Extended Architecture).

Another approach is to use what is called virtual memory. Virtual memory has two advantages. The first is that two or more programs can refer to the same address in virtual memory, but the hardware in the processor or memory management unit keeps them apart and converts them into two distinct references to different memory locations. The second is that virtual memory doesn't really have to exist (obviously there has to be some real memory, but not nearly as much as you are able to refer to), thereby allowing much larger programs to run in a small memory space.

The first feature is achieved through

Figure 1. *Time-slicing effectively switches the processor from one task to another so fast it appears to run all at the same time.*
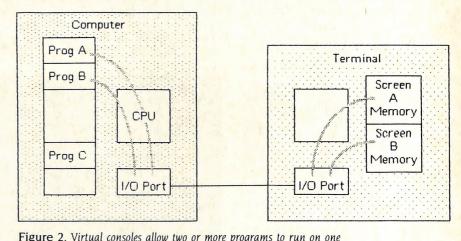
Figure 2. *Virtual consoles allow two or more programs to run on one terminal.*

adder or similar circuitry in the processor or memory management circuits. Whenever a program refers to a particular address in virtual memory, the circuitry adds this address to the base address of the program, thereby constructing the real memory address. In practice, mapping of virtual to real address spaces can be considerably more complex.

Whenever a virtual address is translated, the table look-up can also check whether the area of virtual memory which is being referred to is currently in real memory or not. If it is, all is well; if not, an action called a page fault is initiated. If the virtual address is not in real memory, it must be on some other secondary storage device — usually the fastest disk drive on the

The Compupro 10 — a Z80 each for four users, plus an 8088 for sharing.

Equally, the operating system has no way of knowing where the end of a report lies; all it knows is that the program has currently stopped printing, but there's no guarantee it won't suddenly burst into life again or that fresh output won't appear in the middle of a report.

Consequently, most multi-user systems provide some way of directing reports and other printed output to a disk file and then asking the operating system to put that file onto its list of files for printing. The program which does this is called a print spooler, and it manages a spooler queue which the system operator can sometimes juggle to give some jobs higher priority than others.

Systems like Concurrent DOS, which provide the ability to run programs designed for single-user operation under a multi-user operating system, generally give 'ownership' of the printer to the first program which requests it and lock all others out until the owner program either explicitly releases the printer or quits. Thus, programs like Wordstar can annoy other users, since after printing a single short letter they continue to tie up the printer while you edit the rest of your correspondence. As I say, first in, best dressed.

Screen management is not normally a problem; each user has one terminal dedicated to his or her use, so there is no conflict for that resource — as long as the user runs only one program at a time. However, if you run two programs, one has to be locked out and prevented from writing to the terminal until the other has finished, as otherwise their jumbled output (not to mention input — where does each keystroke go?) will be indecipherable.

Multi-tasking systems like Concurrent DOS handle this by using the multiple pages of memory found in modern 'smart' terminals to display multiple terminal sessions. As long as one program is in 'foreground mode' on the terminal, output for the other will be buffered up, either in memory or on disk. When the user switches screens, the dammed-up output suddenly pours forth onto the screen, until it catches up with what the processor is currently doing.

More complex is the case of multi-user systems which have windows on the screen, *a la* Topview, Concurrent DOS and Microsoft Windows. These are primarily available for the IBM PC as a single-user system, but the day is near when they will be multi-user. The problem is to keep ▶

system or perhaps a bank-switched memory board. The operating system then finds an unused area of real memory, reads the page of virtual memory into it, and sets up the memory management tables to re-direct virtual memory references to this page of real memory.

Using this scheme, programs can be written which allow access to hundreds of megabytes of virtual memory, but which can run in as little as one megabyte of real memory. Of course, performance will be affected, as the program will frequently have to wait while virtual memory pages are loaded into real memory, but with a fast enough hard disk and processor this is not such a heavy price to pay (now you can see why the AT hard disk is so fast — it has an average seek time of 40 ms).

Resource Sharing

Now we've arranged for the two most important resources to be shared (processor and memory), we can turn our attention to the other parts of the system. Let's look first at how disks are shared on multi-user machines.

The problem is not that major really, since all file handling is (or should be) done through the operating system, and

there's only one operating system. Since the operating system knows which programs have opened which files, it is able to resolve requests between competing programs. In general, it's first in, best dressed. The first program to open a file owns that file, and others are simply denied access. If a program knows it is running in a multi-user environment, however, it can open files in a shared mode, either allowing other programs to open the file for reading but not writing, or allowing some specially written programs to have full read-write access to a shared file.

Operating systems which allow both reading and writing of shared files have to be able to handle record locking; that is, denying access to a particular area of the file (but not others) while that area is being operated on (for example, an inventory record being updated to reflect an order). Unix, for example, did not incorporate record locking for most of its life, and different Unix implementations attack the problem in different ways.

Printers have to be handled in a similar way. Programs cannot have unrestricted access to system printers, since if two programs started printing at the same time, their output would be jumbled.

programs from overwriting each other's output on the screen, which turns out to be a non-trivial task unless you have specialised hardware assistance from the processor.

Performance

How do multi-user systems compare with single-user boxes? Very favourably in many cases.

The glib answer is to assume that if one processor services three users, each will receive one-third the performance of a dedicated PC. That's not the case. For a start, if only one user is on the system, he or she receives the full power of the CPU, which can be more powerful than you would find in the average PC. Next, even if all three are on at once, very often the system is simply idling, waiting for someone to press a key so it can do something.

As long as two out of three processes are on the 'wait list' described above, the third will run at full speed, with only the overhead of the despatcher interrupting every system tick. That's the prevalent case in many systems which are used for, say, office automation: five copies of the word processing software will run as fast as one, simply because even five people typing at once still don't use up all the CPU power, and the programs spend most of their time on the wait list, waiting for a keystroke.

Some programs, on the other hand, are 'compute-bound'. That means they use no external resources, but simply run on the CPU with only very infrequent input/output. The Sieve of Eratosthenes benchmark would be a good example. Once it loads and starts running, it never waits for any external device until it prints its results. Three copies of the Sieve program, running on a multi-user system, would each run at one-third normal speed.

I/O-bound processes, on the other hand, barely affect the system. For example, on our office Compupro system, we've had five copies of Wordstar running at once, while simultaneously performing a file transfer using Ward Christensen's XModem protocol at 9600 baud. Five copies of interpreted Microsoft BASIC running the Sieve benchmark would probably have stopped the system in its tracks.

We usually have a program called Tach running on our main system console. This program displays a bar chart showing CPU idle time, in per cent, and it rarely falls below 80 per cent. Programs which perform heavy disk I/O, or which are interpreted, like Microsoft BASIC or dBase, will cause it to drop rapidly to zero, but it rarely

One advantage of virtual memory is that it doesn't really have to exist (obviously there has to be some real memory, but not nearly as much as you are able to refer to), thereby allowing much larger programs to run in a small memory space.

■

stays there for long, and other users rarely notice performance degradation when it does.

Advantages of Multi-User Systems

The first advantage of multi-user systems over networks, standalone PCs and other solutions is cost. All the expensive bits of hardware like a high-performance processor and disk drives, power supplies, I/O ports and so on are concentrated in one shared resource. Each additional user can be added for the cost of a terminal, which can be as low as $500 each.

Files are automatically shared at the same level as on networks, only faster, since there is no comparatively slow network file transfer; data goes directly from disk to the user's memory, usually under the control of a high-speed disk controller.

The sharing of certain resources requires that they be higher-performance than on PCs, and certainly, when demand is heavy, performance is not much better than on a PC. But when usage is light, or you are not competing for disk space, performance is so much better than a PC ...

Multi-user systems allow far more sophisticated programs than single-user systems. For example, programs can run other programs, and can create child processes which each perform their own part of a task. This makes applications like data acquisition and process control much easier to write, since one program can be written to update a file while another periodically performs statistical processing and displays the results. A single program to do both would be much more complex. Communications programs become much more powerful, once a few problems are overcome.

Multi-user systems such as Unix and MP/M have been around for a long time, and have long solved the file-sharing problems which are only now being addressed by networks. The MP/M and Concurrent DOS family of operating systems provides a particularly stable environment for multi-user transaction-oriented systems, such as inventory and order entry. Unix standards are now emerging, and DOS 3.1 has shown the way with network file-sharing calls, though software which uses them was yet to appear at the time of writing.

Finally, multi-user systems such as Unix and Concurrent DOS are often supplied with a set of utility programs which provide the basis of a usable office automation system. Our office Concurrent DOS system, for example, provides a mail system, direct terminal-to-terminal communication through the write program, an appointment scheduler and a program called Chron (shades of Unix) which can run other programs at a pre-arranged date and time.

Of course, you may say, I can do all that with Sidekick, but can you run two copies of the Sidekick notepad, editing two files at once? I'm currently running two copies of Wordstar and editing two stories at once, and if I want to look up an address I can run my cardfile program on a third virtual console.

Minuses

Most multi-user systems rely on external 'smart' terminals which have, at best, primitive graphics capabilities. Strictly speaking, this has more to do with the choice of terminals than the choice of computer or operating system. A Lear Siegler ADM-3/5a, for example (the original Dumb Terminal), is capable of higher-resolution graphics than a PC if fitted with a Retrographics graphics card. Digital Research's GSX graphics driver is capable of driving such a terminal and others, and I'm sure similar GKS drivers must exist for Unix.

However, in the meantime that's cold consolation if you want to run Framework or Lotus 1-2-3, which rely heavily on the IBM PC hardware.

And of course, on compute-bound applications, the performance of a shared processor is lower than that of a dedicated processor. Against that, the economics say you could perhaps afford to share a 68010 or 32032 processor between three users, or give each a (comparatively) flea-powered 8088. Which is better? I know which I'd prefer ... □

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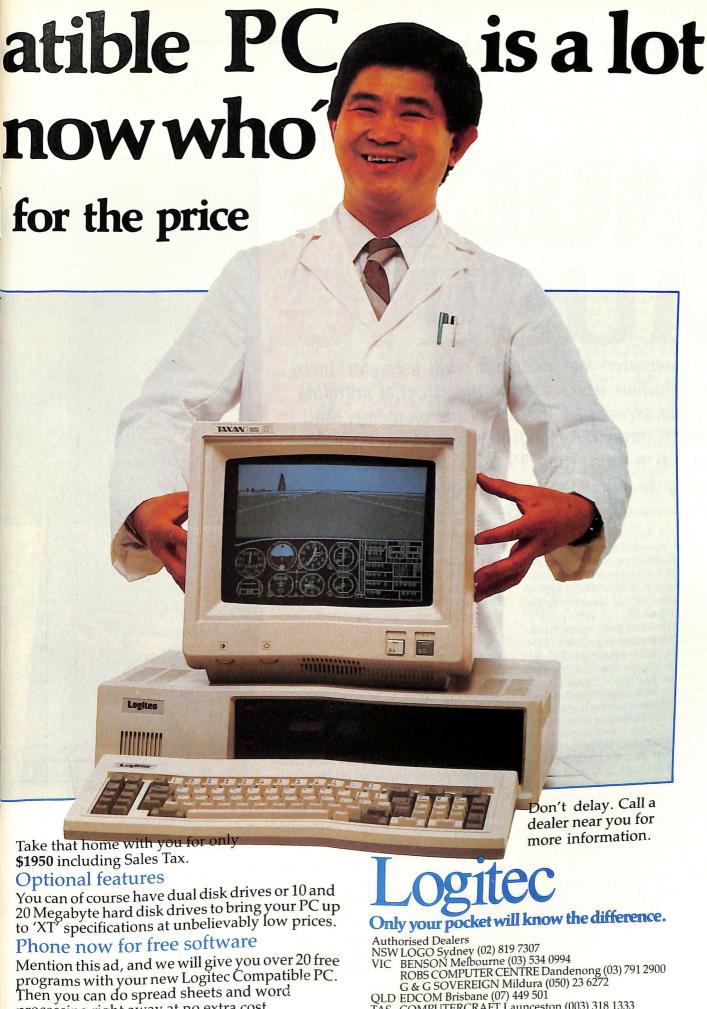
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LOGIK 94

MULTI-MUSING

'Your Computer' has lived with multi-user machinery for nearly four years, even to the extent of providing computer services for the rest of the company. Matt Whelan traces the magazine's move from a single Apple II to supporting 35 users on six machines, including its own 13-user 80286-powered supermicro.

S itting in the 1985 *Your Computer* office, crowded as it is with terminals, laser printers and modems all hooked to a state-of-the-art 80286 processor, it's hard to imagine that the magazine started life running all its work on an Apple II.

It did. Communications, typesetting, accounting, writing, editing, software testing, budgeting, and subscriptions all flowed through the 6502-underpowered machine with its 140 Kbyte drives.

Naturally, it was a giant step forward from the manual systems which preceded it. We didn't really understand why Les Bell always chuckled when he visited the YC office; he used to gaze along the bookshelves filled with boxes of minifloppies, then the two-foot-long tray of 'work disks', and mutter about storing information on postage stamps and processing it with a quill pen.

Les would never take seriously our protestations that the Apple did the job as well as we needed it to, that we didn't need anything more powerful. He just kept saying we'd find out for ourselves sooner or later.
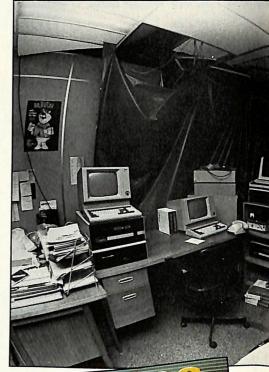
Sooner or later turned out to be early 1982, when we ordered our first Compupro. It was a simple 64 Kbyte machine, with console and printer ports and twin floppies. A plain vanilla CP/M box, it had two
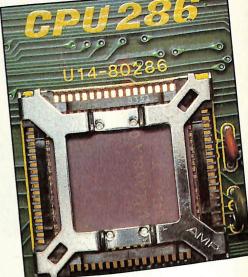
important differences: a Compupro 8085/8088 dual processor (a rare and important combination in the days when the micro world was thinking about moving to 16-bit); and two 1.2 Mbyte double-sided double-density floppies (that was important because they were twice the size of Bell's drives . . .).

Bigger, Better, Proper . . .

The changeover to the new machine certainly proved Les's point to us. If lesson number one (when we started using the Apple) was *a computer does it better*, then lesson number two was *a bigger computer does it better, proper*. And this time we had avoided locking ourselves in to one performance level — the S100 bus design left plenty of room for expansion (we had filled only four of the 20 slots), while Compupro's devotion to leading-edge technology promised to satisfy any future craving for power.

You would think a jump to 10 times the disk capacity would have satisfied us for a while, but once on the power treadmill we had no desire to step off. We were already looking at the specs for MP/M-816, Compupro's own version of MP/M-86 designed to run both 8- and 16-bit programs transparently on the dual processor. It made us drool. But first we needed a hard disk — while you *can* run multi-user on floppies

As fast as a thoroughbred, but less temperamental: our Compupro 286 (and three other similar systems) survived holes in the roof, water and falling cement during construction of our new offices.

you'd be crazy to try.

Christmas came early when we latched on to four 20 Mbyte Fujitsu drives at a low (in those days) $1750 each. We only planned to use one on our system, but could see by then that the others would come in handy. Parent company Eastern Suburbs Newspapers was growing at a spectacular

rate; it hadn't used computers at all, but was starting to show a distinct interest in the varied tasks being performed on the Compupro.

The period between purchasing the Fujitsu drives and the arrival of our first multi-user operating system taught us lessons number three and four. Number three was *all business computers should have a hard disk*. While we survived quite happily on the tiny Apple floppies, or the bigger ones on the Compupro, the productivity increase from the hard disk was enormous, even discounting the amazing speed improvement.

If you simply counted up the thousands of times we had performed the old floppy-shuffle, and measured the cost in operator time, you could justify the purchase of a hard disk very quickly. Having all your information on-line (and the room to fit new applications, as well) is of undisputed benefit. Don't tell me you don't *need* a hard disk — I'll agree you can live without it, but I'll insist you'd profit from having it.

Lesson number four is fairly obvious to anyone who has bought computer equipment, but has really been brought home to us in our quest for the ideal computer environment: *what you want now has been released, but isn't available*. This applies particularly strongly to multi-user systems, where advancements are easily conceived (often because they're so

obvious) but not so easily implemented. MP/M-816 was an ideal concept, providing file compatibility with CP/M and operational compatibility with both CP/M-80 and CP/M-86 in a multi-user environment. It was clearly the best solution at the time.

It was under development before we ordered the Compupro. It was released early enough for us to entertain the idea of running it on floppies. We received it some months *after* installing the hard disk. And when it finally came, as version 2.1C (we don't know who might have used 2.1A and B, or how they managed to get hold of it), we almost wished it hadn't.

Good News and Bad News

Our first experience with multi-user software was to set the scene for the years to come: we had some good news, and some bad news . . .

The good news was the operating system lived up to its specification, allowing us to run all our applications without conversion. We could use our 8-bit software, start using 16-bit programs as they became available, and do it all using the same disks and file system as before. And, most importantly, we could have several people doing it at once, rather than queuing for the machine.

The bad news was reliability. A few small flaws in the operating system made it easy to crash, and a crash when four people are using a system means it hurts four times as much.

Les Bell didn't improve things. Always devoted to torture-testing new products, he would wander in for a look at the new system and sneak from terminal to terminal starting up PL/I compiles, seeing how many it would take before our office staff was slowed to a crawl.

His next delight was 'playing' with 8086 assembler, something he couldn't yet do with his own machine. Even ignoring his experimentation with the processor's HALT instruction (it worked — just ask our enraged secretary), this was our first discovery of lesson number five: *don't mix software development with 'real' work on a multi-user system*.

We still don't pay enough attention to that rule, which is why users on the YC system instinctively save their work more often than anyone else we've seen. We also inflict on them more experimentation and hardware and software changes each year than most users would see in five, so we must take much of the blame for the bad news end of our multi-user experiences.

We tend to buy and install the first version of any new operating system or hardware component, cop the problems that come with it and, just when the whole system has stabilised and is performing reliably, we go out and do it again. We deserve the problems we get, although we're still convinced our approach is the one which best serves the magazine's readers.

The problems we suffered with version 2.1C were few, but severe enough to be annoying. The major fault was the machine's tendency to die if you overflowed the type-ahead buffer; with auto-repeat keyboards, that happened more often than you'd expect as people left books (or parts of their bodies) on the keyboard for a minute as their attention was distracted. It was disappointing that minor bugs could cause such severe problems, and left the impression that a great OS had been spoilt by sloppy programming and testing practices.

The machine also slowed down to walking pace, occasionally dying, if you left a terminal, modem or printer connected to it but powered down.

Roll Another One

We waited only a month or two before laying out money on the table for the next version of MP/M-816 — buying it from its authors instead of Compupro. The worst thing Compupro ever did (or so it appeared from this far away) was part company with the Gifford brothers, Bobby Dale and Mike, whose G & G Engineering had carried out their operating system development. From then on it didn't matter that Compupro gave away MP/M-816 with its systems — you still happily paid $1000 for a Gifford version to get the reliability and extra features such as mail, communications, terminal-to-terminal 'chatting', increased security, and more.

Compupro had the inspired hardware designs, but the Giffords cut the classy operating systems. It has been the same all along, although now we're looking harder at Compupro's much-improved software as the Giffords move away from Compupro-based S100 products to concentrate on their own computer.

Gifford's version 2.1E was a delight, and for a time our system stabilised enough to be called bulletproof. That was the good old days. We took so much work onto the YC system, running database and accounting applications for the rest of the company, that we soon had to expand with a ▶

second, then a third, multi-user Compupro.

We moved them all to version 2.1F, which provided 'virtual terminals' — multiple logins available from one physical terminal, providing multi-tasking for each user. The productivity benefits of this arrangement (more recently 'formalised' by Digital Research with Concurrent CP/M) are enormous. Reverting to our then-state-of-the-art CP/M-80 system, even on the hard disk, felt like a step back into the dark ages.

We skipped version 2.1G (we bought one to go with a new drive, but then loaned the drive within the company) to wait for MC-DOS, Gifford's multi-user implementation of Concurrent CP/M 3.1. And we waited.

In the meantime we decided the once leading-edge 8085/8088 processor board was old hat. It was the ideal tried-and-proven basis for a business system, but did nothing for our powerlust. We left the solid processors in the work systems (by now there were four of them) and ordered a System 816D — it ran Compupro's CPU 286 board, had two Mbytes of memory disk, a 40 Mbyte Winchester, and ports for 10 users. Under Gifford's operating system we could make the RAM disk the A: drive, so with our applications software loading directly from memory and the 80286 processor executing it, it ran like a blur.

When we finally installed MC-DOS, with its hashed directories and disk buffering, we really started to fly. The new operating system provided as much of a performance shot-in-the-arm as the 80286.

We knew we'd paid a penalty (again) for being first kid on the block — Compupro was one of the first manufacturers to ship 80286-powered machines, and we received one of the first of those. Our machine came with a 6 MHz B-step chip (as did most of the later-release IBM PC ATs), which had a bug that would kill a multi-user OS if run flat out. We had to slow it down with wait-states to survive. We also lost the benefit of our 8-bit processor, and as some of our software is still 8-bit, we slowed the whole system down running it under a software emulator.

In At The Deep End

We soon jumped in at the deep end and bought a Macrotech dual processor board; designed as a slot-in replacement for the Compupro 8085/8088, it runs a B-step 80286 and an 8 MHz Z80. On-board smarts do a lot to get around the Intel chip's bug, so it runs around 30 per cent faster than the Compupro 286.

We tend to buy and install the first version of any new operating system or hardware component, cop the problems that come with it and, just when the whole system has stabilised and is performing reliably, we go out and do it again.

It also happens to dislike M-Drive boards, various memory boards, and the occasional disk controller. Away we went on the 'who needs reliability when you can have grunt' tangent again. The worst discovery was the M-Drive problem; Gifford's latest OS uses these boards (if available) for its cache buffering and when this is flushed to disk you end up with garbage in the directory.

Something had to go, and you should be able to guess by now it wouldn't be our hotrod engine — the M-Drive boards are sitting in the cupboard . . .

The system is hard-worked, but a rewarding performer. We have 12 terminals, a modem providing a remote terminal, and four printers running on the same basic box we purchased as a 64 Kbyte CP/M machine in 1981. It has a megabyte of main memory (not enough when everyone tries to work at once), and the 40 Mbyte hard disk is bursting at the seams.

The other systems aren't nearly as pushed, nor are they nearly as fast. One system still runs MP/M-816 on an 8085/8088 — and these days that's s-l-o-w. The others run Concurrent, and do so fairly successfully. They're close to bulletproof, except for lesson number six — *life would be perfect if it wasn't for users.*

One of the great problems of a multi-user environment is the (necessary) existence of a system manager. The users can turn to this person for help rather than reading the manuals, and can expect the manager to handle all sorts of boring things like back-up and so on. In many cases the users are given a terminal to do a particular job, and have no interest in computers — they require a lot of training and

hand-holding and, as soon as something out of the ordinary happens, they're completely lost.

If you think about how often you've had a program die for unexplained reasons, and multiply that by the number of users on a system, you can imagine some of the frustrations of life in a multi-user environment. It's true that not all crashes take the whole system down — most don't — but when it does happen and it's not your fault it's a real pain. Uneducated or uncaring users seem to have this problem a lot more than others.

It's the same on single-user PCs, of course, but there the problem doesn't affect others. And generally those using their own machine are doing so because they've asked for it; even if they haven't, more often than not they become enthusiastic about the machine once they've been lumped with it.

The user interest/education problem is symptomatic of an 'image' problem suffered by multi-user machines. Because they sit in a corner (or another room) and service several people, they're 'big' machines even if they are micro-based. And big means it all happens automatically, either done by the machine, or by the system manager and, perhaps, support staff.

Yet multi-user micros don't carry the cost burden of big machines — high-priced software, peripherals, maintenance contracts and, perhaps, support staff. They really are just big PCs, and users need to understand that. Treated that way, they're hard to beat: they're personal computers which cost less per 'machine' than desktops, they allow sharing of files and work, and usually allow more disk capacity and a variety of on-line printers because the resources are shared around.

Going multi-user is an excellent, cost-effective solution. With prices dropping, a Compupro 80286-powered box with 768 Kbytes of RAM, a 10 Mbyte tape drive and 40 Mbyte Winchester can be had for around $17,000 tax-paid.

Onward and Upward . . .

Despite the punishment it takes the YC system is stabilising again, so it must be time to move on. Yes, Compupro is now shipping bug-free 8 MHz 286 boards, along with high-speed Z80 slave processors. We know the old dual-processor software won't work with this configuration, and we know the version to suit the slaves will be full of holes, but . . . well, we just can't help ourselves. □

GROUP SPECS

Supermicros one month, multi-user the next . . . are we telling the same old story? Not really, although when we get down to detailing the machines involved it does look a little like *deja vu*.

Supermicros are all about power and performance; multi-user machines mean practicality in group computing. In many cases, it will be the same machine that does the job, even if it's selected for different reasons.

What follows is a brief outline of the multi-user computers available. Many (but not all) of the machines listed here are supermicros; if you're looking for more detail on individual models you should check our November issue.

Discovery Multiprocessor: The Discovery is an S100 bus system which uses multiple processors rather than sharing one among multiple users. It allows combinations of 8- and 16-bit processor boards, with an 80186 service processor handling disk and printer operation. Hard disks of 26 to 260 Mbytes are available. Talk to Archives Computers, Suite 406, Philips Building, 15 Blue Street, North Sydney 2060; (02) 922 3188.

Toshiba 1500/PC Slave: Archives also sells a multi-user Toshiba, with PC-Slave processors providing the punch for the add-on users. A three-user system with 35 Mbyte hard disk, printer, cables, and so on sells for $22,686. Talk to Archives Computers, Suite 406, Philips Building, 15 Blue Street, North Sydney 2060; (02) 922 3188.

The Big Boys' Little Machines: The big computer manufacturers like IBM, DEC and Burroughs have little-known (in the micro world, at least) multi-user systems. IBM's System 34 and 36 models and DEC's Micro-PDP and Microvax are examples of upmarket multi-user micros that ▶

may be well worth a look, especially if you are ever likely to upgrade to these companies' bigger systems. The Microvax, for example, is said to be fully software compatible with its bigger brothers. DEC claims it is almost the equivalent of a 'real' VAX on a chip. Other companies to look at include Prime, Data General, NCR, Perkin-Elmer, ICL, and Datapoint.

Northstar Dimension: If you're into IBM PC software but want a multi-user system, the Northstar Dimension provides for up to 12 users who get their own processors and memory, but share disk drives and peripherals. The Dimension was reviewed in YC February. Talk to New Dimension Computers at 15 May Court, Dandenong 3175; (03) 792 4152.

Compupro System 286: The Compupro System 286 is an S-100 (IEEE-696) machine based on the Intel 80286 processor, and housed in a new compact desktop enclosure which includes at least one minifloppy drive, a Winchester and tape backup. Current pricing is attractive at around $17,000. Talk to Automation Statham, 47 Birch Street, Bankstown 2200; (02) 709 4144.

Zilog System 8000 The Zilog System 8000 is based on the Z-8000 16/32-bit, high-speed CPU and is designed specifically for the Unix operating system. There is a wide range of Zilog models, starting from a $25,000 system which supports eight users, and has 512 Kbytes of memory and a 52 Mbyte hard disk. This is expandable to 672 Mbytes of disk space, support for 40 users and 4 Mbytes of main memory. Talk to Cadon Computers, 15th floor, 8-20 Napier Street, North Sydney 2060; (02) 920 1381.

Colex Hi-Rise DM/6: A three-user Unix machine which sells for $23,274, the Colex is an attractive floor-mounted computer with up to 2 Mbytes of RAM. Standard equipment includes a 25 Mbyte hard disk and floppy, plus 1 Mbyte of RAM. Talk to Colex Australia, 31-33 Hume Street, Crows Nest 2065; (02) 439 8766.

Labtam 3015/V32. The Labtam 3015/V32 is a 32-bit, floor-mounted unit which uses the National Semiconductor 32032. Mass storage comes from a 56 Mbyte hard disk, 45 Mbyte streaming tape, and 1.2 Mbyte 20 cm disk drive. Eight RS232 ports and 800 by 600 pixel graphics are also included in the $34,500 before-tax price tag. Talk to Labtam International, 2 Help Street, Chatswood 2067; (02) 411 2588.

Olivetti/AT&T 3B2: The AT&T 3B2/300 computer is a 32-bit desktop supermicro based on the WE 32000 microprocessor. The 3B2/300 is designed to support up to eight users. The 3B2/400 is a supermicro which fills a gap between the 3B2/300 and the 3B5 series; it's designed to support up to 20 users and standard memory is 512 Kbytes. Talk to Olivetti Australia, 140 William Street, Sydney 2000; (02) 358 2655.

Dual Systems: The Dual 83/80 is a high-performance microcomputer with 80 Mbytes of storage and support for up to 12 users. That takes care of $34,000 . . . if you want to spend more than double that, look at the Dual 83/500; in basic form it supports eight users, with optional serial capacity to take that to a maximum of 16 users. Talk to Dual Systems Australia, 55 Phillip Street, Parramatta 2150; (02) 635 6651.

Visual 2000 : A low-cost ($17,000) multi-user system based on the Intel 80286 CPU, the Visual uses Multibus or IBM PC AT expansion. Standard configuration includes 512 Kbytes RAM, 19 Mbyte disk, 800 Kbyte floppy, six RS232 serial ports, and a parallel port. Talk to Kenelec (Aust), Suite 8, 54 Alexander Street, Crows Nest 2065; (02) 439 5500.

IBM PC/AT: The AT is, naturally, getting more market support than any other machine with multi-user capabilities, but most of the the coming flood of AT software will be single-user — its value as a multi-user machine will rely on the number of applications available under Unix or Concurrent DOS. The AT comes in two flavours: the base model gets

one half-height 1.2 Mbyte diskette drive and 256 Kbytes of memory, while the up-market one gets an additional full-height 20 Mbyte fixed disk drive, serial and parallel ports, and a total of 512 Kbytes of memory. Pricing is high at $7821 for the base model and $11,256 for the enhanced version.

Fortune 32:16: Fortune's 68000-based 32:16 is a multi-user desktop system, expandable to 13 users, which claims particular advantages in the area of communication with other machines. It comes with 512 Kbytes RAM, an 800 Kbyte floppy, and a 10, 20 or 30 Mbyte hard disk. Talk to Datacraft Office Systems, 99 Alexander Street, Crows Nest 2065; (02) 438 3688.

IMS Bus-Plus: IMS International says it has solved the problem of bogged-down supermicros with its Turbodos-based multi-processor system. Talk to IMS International, 23 Berry Street, North Sydney 2060; (02) 922 3977.

AT Lookalikes: They're bobbing up at a surprising rate, and they'll suffer the same limitations in multi-user configuration as the AT. Quick-off-the-mark manufacturers include Compaq, Kaypro, NCR, and, locally, President Computers and Perito Holdings. Prices are generally much lower than the IBM.

Mitsui's Esprit DBS16 and X16: Mitsui has announced two machines from Esprit Computer Products, which depart from both the AT style and the usual supermicro design. Based on the 80186 processor, 'little brother' to the 80286, in their basic form they provide for four users, with 512 Kbytes memory and a 19 Mbyte hard disk. The DBS16 is designed to run MP/M-86 or Concurrent DOS, while the X16 is built to run Xenix 3.0. The DBS16 bus can take up to six extra slave processor boards, each with its own memory and capable of supporting four users, so you can pile a lot of computerists onto it if need be. Prices start at $11,280. Talk to Mitsui Computer Limited, 1-3 Rodborough Road, Frenchs Forest 2086; (02) 451 7711.

Wicat: Wicat produces a range of machines, from the 150 through the 155, 160, 220 and 2220. All are based on the Motorola 68000/68010 processors with varying amounts of memory and mass storage. The bigger machines support up to 128 users, 16 Mbytes of memory, and 3800 Mbytes of on-line disk storage. Talk to Wicat Computer of Australia, 77 Pacific Highway, North Sydney 2060; (02) 957 2655.

CT Miniframe and Megaframe: The Convergent Technology Miniframe is a small tower package based on a 10 MHz 68010 processor and running Convergent's version of Unix System V — CTIX. A minimum system is supplied with 512 Kbytes of RAM and a 10 Mbyte hard disk. The Megaframe is a multi-processor-based supermicro claimed to be able to support up to 128 users with a maximum throughput of 8 mips. Talk to Sigma Data Corporation, 11th floor, 157 Walker Street, North Sydney 2060; (02) 957 3777.

Morrow Tricep: The Tricep is an S100-bus-based machine, which runs a 68000 processor (in fact, Morrow is using Compupro's CPU 68K board) coupled with a Dual Systems DMA I/O board and Morrow hardware for the rest of the system. The system is supplied with the Uniplus port of Unix System V, and supports four users. Talk to Automation Statham, 47 Birch Street, Bankstown 2200; (02) 709 4144.

Cromemco X Series: The X Series is based on the Motorola 68010. Two models were released initially, while a third was added this year. The CS-100, which has an 8-slot motherboard with a maximum of 4 Mbytes of memory, and the CS-300, which has 20 slots allowing more expansion, were first. The CS-400 comes with a 140 Mbyte drive, 4 Mbytes of RAM and a 32 Mbyte cartridge drive. It weighs in at around $47,000, but expansion can take this to $80,000. Talk to Minicomp Software & Hardware, 104-108 Mount Street, North Sydney 2060; (02) 957 6800.

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terminal

terminal

printer

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Further
Universe
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WA: AED System Developments Ltd of WA 465 Canning Highway, Como 6152. PO Box 22 Como 6152. Ph: (09) 450 5888.

"Also see our advertisement on page 115"

Glover & Assoc.

THE DATAMAX 186

Frank Lee hops astride a new multi-headed power horse with a 'Made in Australia' label.

BY NO STRETCH of the imagination is the Datamax 186 a personal computer — it's more of a minicomputer in a desktop frame, although, at its recommended retail price of $9800, it's a bit out of the range of most home computer enthusiasts. The 186 is billed as a 'Professional Computer System', a true multi-user system designed for networking applications. Developed and manufactured at Datamax's Manly (NSW) facilities, the 186 is the latest brainchild of the company's founder, Mr Chin Kwong.

As its name suggests, the 186 is based on the Intel 80186, a 16-bit processor which hums along at 8 MHz. There is also a 4 MHz Z80 dedicated to communications control. In its basic single-user configuration the system comprises 512 Kbytes of RAM, a 20 Mbyte hard disk, a 1 Mbyte 20 cm floppy disk drive, plus video display terminal and printer. A 13 cm disk drive is available as an alternative to the 20 cm drive. The average access time for the hard disk is 85 ms; track-to-track seek time is 3 ms, and a cartridge tape unit is also available for backing up the hard disk. The 130 watt switching power supply is from Scientific Devices in Melbourne.

An impressive machine, the 186 is roughly the same size as the CompuPro 8/16, with which it shares a number of common features. Unlike the CompuPro (which uses an S100 bus), the Datamax has a single large system board with sufficient room for expansion. The box measures 47 cm wide by 51 cm deep and is 19 cm high. The front escutcheon includes a key-operated power switch, power-on indicator and reset button.
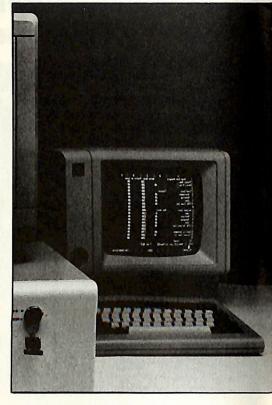
Although a terminal may be positioned on top of the unit, it sets the screen a bit too high for comfort. A more usual configuration would have the 'mainframe' strapped below the desk and to one side, with the terminals occupying desktop positions. The 186 was not intended as a 'single-terminal' system; in its maximum configuration it is capable of supporting 10 workstations, or nine stations plus a network.

Computers designed for separate terminal systems generally have a distinct advantage over those designed for directly driven monitor screens. The latter category (into which most personal computers fall) is burdened with the overheads of refreshing the screen from dedicated main memory, while with systems like the Datamax 186, the task of screen management is distributed over the attached terminals.

The 186 isn't particularly light. At 20 kg, it's no 'transportable' — but then that's the point. This is a professional stay-put workhorse, a multi-user system which when networked with similar systems has the potential for supporting over fifty users.

Looking Inside

The internal construction of the 186 is particularly open. Ease of maintenance was a major design requirement, and access to the main system board is virtually unobstructed by the disk drives and power supply. Consideration has also been given to effective heat dissipation and forced-air cooling, although the fan is remarkably quiet.

RAM is expandable on the two-layer main system board to a fully addressable 1 Mbyte. In addition to main memory there are 10 Kbytes of dedicated dual-ported memory used by the communications controller.
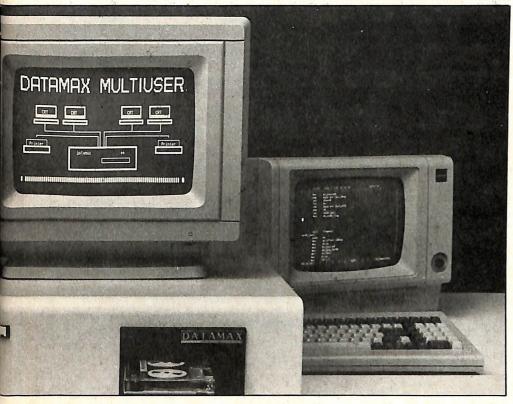
About one-third of the system board is dedicated to the Z80-based communications subsystem. There are four RS232C serial ports, each capable of 9600 baud, and one of which may be configured for synchronous RS422 communications for networking. If required, another six serial ports may be added, allowing the system to support up to 10 users. The 80186 processor is thereby relieved from both screen and communications management. There are also two Centronics-compatible ports for parallel printers.

Both floppy disk options are Matsushita drives. The 13 cm drive has 360 Kbytes' capacity and follows the nine sector/track format used by PC-DOS 2.0. The double-sided 20 cm drive stores 1.2 Mbytes using the Gifford Concurrent DOS format. For both drives, the XIOS ensures the read/write head is lifted and the drive motor stopped when the disk is inactive.

Options

In its first release the 186 offered a 10

mined by minimising bottlenecks. It would not make sense to run a word processor on any other than the attached node, since there can be a great deal of traffic between the processor and the terminal. On the other hand, database enquiries and accounting applications could well be distributed across the entire network.

Software
The supplied operating system is Concurrent DOS 4.1 with the usual system utilities. Each attached workstation may execute two tasks simultaneously, and pressing a terminal's F11 function key toggles between tasks. Shared software must reside in the User 0 area of drive A and must have SYS and R/O attributes.

There are no bundled application packages, which is normal practice with multiuser systems since users have widely varying requirements. Separately available word processing software includes Wordstar, Mailmerge, Spellstar and Spellbinder, and the system also supports dBase, Infostar and Dataflex. A variety of extensive accounting, spreadsheet, statistical and graphics packages is also available.

Most standard 16-bit software tools may also be used with the 186 since they require only the most conventional of screen facilities. Examples include DRI's FORTRAN, PL/I, C and CBASIC compilers.

Benchmarks
Just to be different, we used a C version of our prime number generator as a CPU speed comparison with the IBM PC. For ten iterations on a PC it took 12.4 seconds to execute; on the 186 the time was 4.3 seconds — almost three times as fast. Neither machine used the 8087 co-processor. The speed advantage was due partly to the increased clock speed, and partly to the wider data bus; the 80186 also executes some instructions in fewer clock cycles. As also pointed out above, the 80186 is not otherwise involved with video screen management; the tests were entirely CPU-intensive.

Documentation
The Datamax documentation is technically comprehensive and clearly written. At present it's looseleaf and bound in A4 format, although plans are in hand to have the material typeset for presentation in the same form as is used by Digital Research. It will then match the format of DRI's Concurrent DOS documentation, which is included with the system.

Mbyte hard disk as standard. By mid-1985 the cost of 20 Mbyte disks was barely above that of 10 Mbytes, and like most other manufacturers Datamax now offers 20 Mbytes as the minimum. Other sizes available at present are 40 Mbytes and 60 Mbytes, with the largest drive including an automatic head-parking system.

Beyond 20 Mbytes it makes good sense to include a matching cartridge tape unit for backup. The 20 Mbyte cartridge adds $2460 to the total cost, but if the tape subsystem and 13 cm drive are included at the time of purchase along with the 20 Mbyte hard disk, the total outlay is $11,890. That configuration is shown in the accompanying photograph.

The configuration you want must be specified when ordering a system, although the additional six serial ports may be added later for an additional $586. A calendar/clock system is included with the serial port option, and main memory may also be expanded on-board to 1 Mbyte for $906.

One of the four standard serial ports may be 'jumpered' by the user for the RS422 network configuration at any time.

Datamax offers two types of terminals, as well as the Mitac PC-compatible as workstations for the 186. The ICL KDS 73 at

$1500 is capable of 19.2 Kbaud, while the $1600 Wyse 50 Plus terminal can match the 38 Kbaud speed of the additional six serial ports.

Networking
With one port configured for RS422, the 186 may be connected to one or more 186s similarly strapped. The physical link is a shielded 100 ohm twisted pair running at 700 Kbits/sec; nodes tap directly into the cable. The protocol is IBM's SDLC, which requires one of the nodes to be assigned the role of master. At the higher levels, all nodes look the same to the users.

The communications software is Digital Research's DRNet, available from Datamax with full documentation for $980. Sixteen-bit processors linked to the asynchronous ports may communicate using DRTalk or Modem7.

Users of a networking system have a number of execution mode options. Software may be downloaded from one of the nodes for local execution on an 8-bit or 16-bit processor. Alternatively, the program may be executed on the attached node, or any other node on the network. Data used by the program may reside on any of the nodes.

The selected execution mode is deter-

Marketing and Service

Following a much-needed injection of capital, Datamax is now in a position to expand operations to include interstate branches. By the time this review is in print a Melbourne branch should be functional, and five such dealerships are planned for the immediate future.

Datamax sees its primary market in small business office automation, although its most successful sales to date have been with mainland China, where over 100 units have been sold. Another potential area is education, where a single 186 is capable of supporting a small but comprehensive terminal laboratory. This is an attractive proposition for small schools and colleges since expandability via networking is already built into the hardware design. Further enhancement is possible by substituting individual microcomputers for a number of terminals as intelligent workstations. The microcomputers would require minimal (if any) disk storage facilities.

The 186 has a minimum warranty period of three months, although longer periods may be negotiated. A maintenance contract for on-site collection and return is available for approximately 10 per cent of the recommended retail price.
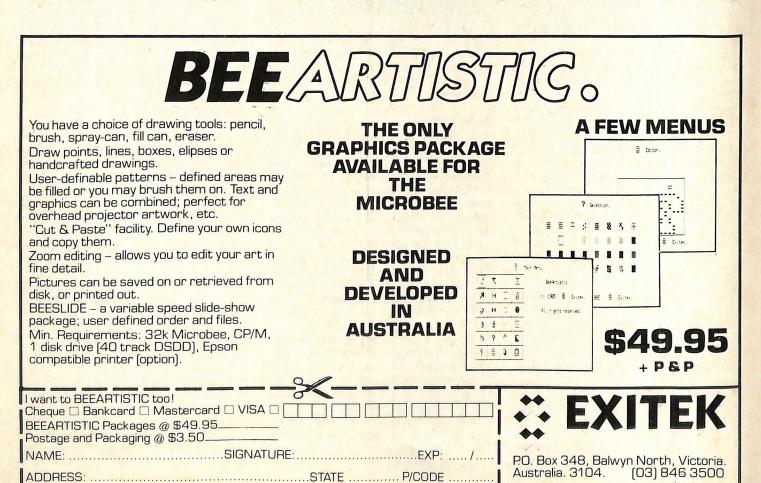
Also available is 'maintenance by exchange', which should be attractive to users who are remote from the nearest service facility. This means the user and the service centre ship at the same time; when the unit is repaired, the same method is used to return the machines to their original owners.

The actual time required to repair a 186 is quite short as a result of the open construction technique, whereby a 'worst case' replacement takes less than three hours at the workbench. For further information, contact Datamax, 34 Central Avenue, Manly 2095; (02) 977 6522. □

RATINGS:	POOR	GOOD	V. GOOD	EXCELLENT
DOCUMENTATION				
EASE OF USE				
DESIGN				
RELIABILITY				
VALUE FOR MONEY				

XL: THE FIFTH-GENERATION AUSTRALIAN

Ian Allen reviews the world's first fifth-generation language, Australia's latest advance in the 'information revolution'.

WITHOUT DOUBT, artificial intelligence is currently the hottest area of computer research. The implications of this technology are enormous and are likely to bring social change on a scale not seen since the industrial revolution.

AI is one of the key technologies of the information revolution, in much the same way as the steam engine was a key to the industrial revolution. It explains why the Japanese have embarked on an ambitious long-term AI project with the stated objective of winning world leadership. The 'fifth-generation' project began in 1983, with a 10-year budget of $600 million. It currently employs around 60 researchers, and involves the full co-operation of major Japanese computer and electronics manufacturers, including names like Fujitsu, Hitachi, Toshiba, NEC, Oki and Nippon Telephone and Telegraph (NTT).

The American approach relies more on the entrepreneurial nature of United States business. Research is happening wherever 'Yankee ingenuity' sees a purpose. With such a strong profit potential, AI research can and does attract venture capital. Apart from free enterprise efforts, the United States government is sponsoring research through NASA and the military. AI has obvious applications in the space shuttle program, and the Strategic Defence Initiative, 'Star Wars', must require some form of AI. (How else could all that hardware respond to a missile attack quickly enough?)

Even on a down-to-earth basis there are plenty of existing technologies being held back by the absence of AI. Robotics is one: present robots don't learn from their mistakes, and any little glitch in the assembly line can throw them into useless catatonic behaviour. With AI, robots like R2D2 and C3PO will become a reality.

: Speech recognition is another area in which the processing power of fifth-generation computers is necessary.

New Hardware, New Software

Any fifth-generation computer will require the development of new hardware and software. The main hardware requirement is the ability to carry out parallel processing. In other words, the computer should be able to 'think' of more than one thing at a time. Most of today's micros have just one logic chip, and although clever software can make them appear to do many things at once, it's really only a sleight of hand, with the computer switching very quickly between tasks. Some micros, such as the Commodore 64, have more than one processor, but the additional 'brains' are used to lower the workload of the main 'brain'. In other words, utilities like screen updates or sound generation are sub-contracted in the name of efficiency.

True parallel processing is a little like having 1000 logic chips in the same computer, all interfacing perfectly with each other to create a 'consciousness'. It's far more difficult to achieve than it sounds, and will almost certainly require more conceptual breakthroughs before it becomes a reality.

Garbage In, Garbage Out

The same can be said of the software. For a computer to have artificial intelligence it must not only be capable of reasoning, but also of learning and of inference. This last quality, inference, is vital if the machine is to 'think' and 'learn'. It means if the computer is given partial information it will be able to infer the rest. The adage 'Garbage in Garbage out' will be turned on its head; intelligent computers will recognise garbage and probably tell you that it is!
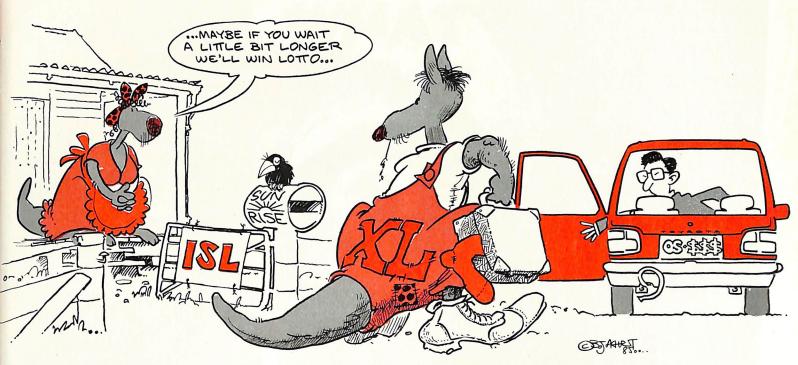
The design of such software really requires development of new models of cognitive thought. So we're again venturing into the realm of conceptual innovation, and for this reason AI is an area where money alone doesn't bring results. Capital investment does help, but in the end the result really depends on human imagination and ingenuity.

Although Australian software companies don't enjoy the degree of government support or access to venture capital found in other developed countries, we do have our share of human talent and imagination. To prove the point, a Melbourne-based software house, Intelligent Systems Research, has startled the computer world by coming up with the first fifth-generation language.

ISR's language is called 'XL' (expert language), and is designed for the generation and running of expert systems. Present expert systems are written to use a knowledge base, or series of rules when evaluating a problem. They can be time-consuming to write and modify, and they don't 'teach' themselves. A further drawback is they can't usually tell you how or why they reached a given conclusion.

XL isn't an expert system; it's a language with which to write your own expert systems. Just as you would use COBOL for text handling or FORTRAN for number crunching, XL is a tool for a task. An expert system which might have taken 12 months to develop using a third-generation language would take only weeks with XL, and it would be far easier to modify. XL makes it possible for you to program your computer to learn from its own conclusions — in other words, to teach itself. It also has the facility to produce an 'audit trail' of its decision processes; that is, it can tell you how and why it came to a conclusion. This is a world first!

Interpreting Information

XL is a true fifth-generation language: it has an inference engine which enables it to interpret information which may not have an obvious logical relationship to other data. XL will search its knowledge and inference base in order to infer a relationship, which can then be used to evaluate the information.

The best way to explain this process of inference is to use an example. Suppose you had written a program to monitor bushfires, with the purpose of detecting and tracking serious ones. XL would require you to build a knowledge base containing information about things like the characteristics of fire, the terrain and types of vegetation, past rainfall readings and so on. Let's suppose you told this program a large pall of smoke had been observed at a certain location. An XL-based program would be able to infer that the smoke was probably from a large fire. Having made this inference, it would check to see how dangerous a large fire in that location could be, give its conclusion, and then you could enquire into its reasoning.

Expert systems based on a third-generation language might be able to cope with such a specific example (without being able to explain themselves), but they don't cope well with the unexpected. Sup-

pose that instead of a pall of smoke, we had seen a helicopter crash: most expert systems would react to that as a 'garbage in' statement, but an XL-based system could infer a helicopter crash may cause a fire, and evaluate on that basis.

Flexibility

The full potential of XL's inferencing really becomes apparent with large knowledge bases. An XL system remembers and considers every pertinent fact and relationship you've ever told it, yet it remains flexible in how it accesses this information, since it can infer backwards and forwards. Although it falls short of the human action of lateral thinking, there are some similarities in the way it interprets information.
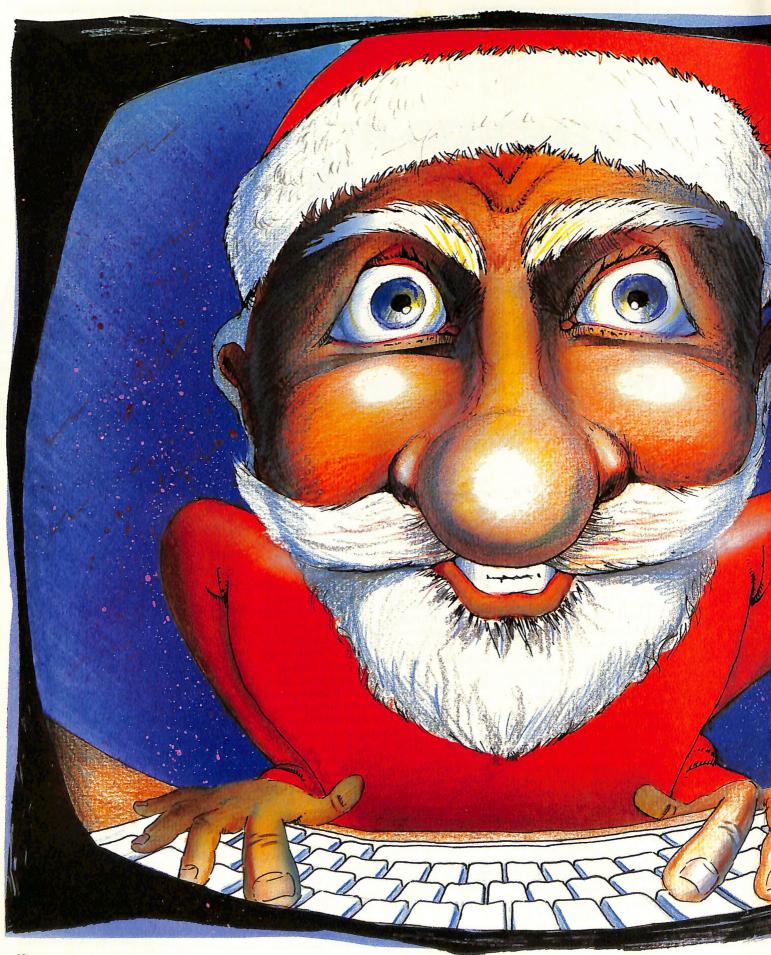
It's little wonder XL has attracted a good deal of interest from multi-national heavyweights. The only software remotely like it runs on a NASA mainframe, while XL in its most basic state requires only 200 Kbytes. This means it will run on any Unix-capable micro.
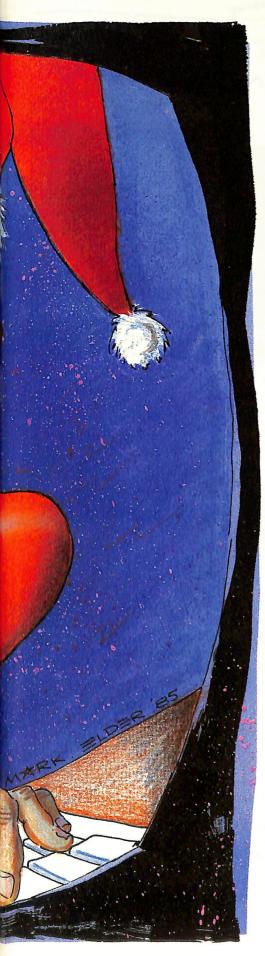
Lack of Government Assistance

Because of it's remarkable features, XL has the potential to become a worldwide standard. Quite apart from the foreign exchange to be earned from royalties, ISR's breakthrough gives Australia a golden

opportunity to become a major developer of AI technology. AI is exactly the sort of 'sunrise' industry the Federal Government has talked about fostering, yet in the three years it took to develop XL, ISR received not a penny from the government. Software wasn't even regarded as a 'product' until quite recently.

In spite of XL's success (or rather because of it), ISR is now fighting to retain its Australian ownership. If XL is to become a world standard, it needs to be exploited very quickly. The AI world is very competitive, and what is now needed is the development of a large volume of applications software. ISR doesn't have the resources to do this by itself, and unless the company receives some form of government assistance it will be forced to raise the necessary capital by selling its equity in XL.

Alan Page, ISR's managing director, is a great believer in keeping control of the farm. He also wants other Australian companies to benefit from XL, and has guaranteed first right of refusal for vertical applications developments to Australian companies. As an effort to keep Australia in the AI race, this can only be applauded. Let's hope the Federal Government doesn't let this opportunity pass. ☐

WHAT TO GIVE YOUR . . . FOR CHRISTMAS

Frank Lee sweats it out in his annual Father Christmas outfit with gifts for all the family, friends and foes.

■

Christmas tide, and all is chaos at Mount Crisis. A daughter getting married, the in-laws from England, there's a bushfire alert and the dog's had a litter. My modem's not working thanks to a stroke of mountain lightning, and my 10 Mbyte hard disk is near bursting with software and data. Maybe someone will give me a 20-meg replacement? The sad thing is that 20-meg hard disks can now be had for the price of the old 10-meg jobs. Sad if you've already invested in a 10; there's not much market for secondhand 10-meg disks.

But Christmas is a time for cheer and sharing — and we all find it more cheerful to be sharing presents *we* like. For a real fun Christmas, we believe in buying everyone a computer present — and we mean *everyone*, from your worst enemy to best friend, from grandmother to grandchild, from boss to secretary, from you to your computer, or even from your computer to you. So here we go with our "what to buy your ..." article. I share with you my fragmented thoughts on this perennial problem, assisted by broad hints from Number One Son.

What to Give Your Worst Enemy

Maybe you're not inclined to spend a heap on your worst enemy. However, Christmas is a time for sharing. And didn't the one whose birthday it is say something about even loving your enemies? That's a toughy, but you could make a start with some of these not-too-expensive items. Here's a chance to unload, oops, I mean share some of your collection of rare historical items. Things like your first Algol program listing, or the operations manual from Bendix Corporation's G-15D compu-

ter (circa 1961). There must be someone out there who would like my collection of 12AT7 twin-triode valves — they're just great for building flip-flops. I've even got circuit diagrams to go with them. And small cardboard boxes containing neatly spooled lengths of punched paper tape (five-level). And how about 10,000 binary punched cards for the IBM 360/40? Now that's tasteful. It would go well with a table of the EBCDIC character set. Or perhaps an expansion chassis for an Exidy Sorcerer?

I once worked with a G-15D. In performance it was about as good as a VIC-20 (but not bad for the early '60s). By the late '60s it was on the way out, making room for a flashy new transistorised beastie. I was offered the G-15D, provided I went to the expense of transporting it to my own back verandah. That was a tough one too: $25,000 worth of gear for nix, plus all the software. I thought about that. Then I thought to myself "there's no such thing as a free lunch" — oh, how true, how true today. Wisdom prevailed. Yep, here's just the sort of thing to give your worst enemy — an obsolete, but working, computer. It's guaranteed to keep him/her tied to its apron strings for years; it'll cost heaps for repairs, and there ain't nobody around who'll repair it anyway. Just make sure you supply all the technical manuals. You'll never see the lucky recipient again.

If he/she is into computer games, there's a real gripper called 'Lunar Lander', which runs on the Texas Instruments SR-52 programmable calculator. Don't part with the calculator, just wrap up the magnetic card.

Why not give your 'worst enemy' something really up-to-date to even the historical balance? Like Digital Research's Ver-

▶

TO: FRANK JR
FROM: FRANK SNR

sion 2.0 PL/I compiler? Or perhaps the ADA compiler for the Commodore VIC-20? A supply of cheddar cheese for the Microsoft Mouse? A copy of the Flight Simulator for CP/M-80 in 20 cm floppy disk format? A special program for unprotecting Micropro Wordstar 3.3? MS-DOS for the Sinclair ZX80? A UV eraser for 'resetting' the EPROMs in your IBM PC? Lifetime membership to the Siberian Microcomputer User Group? A chip which converts your Pong game into a PC AT?

I've got it! A plastic double-insulated cover to protect the computer from the harmful effects of Halley's comet when it returns early next year. It could be bundled with a reprint of Ed Dijkstra's famous paper *Halley's Comet Considered Harmful*.

The Amstrad CPC 464 — one of the less expensive computers worth considering as a gift for Jr.

What to Give the Kids
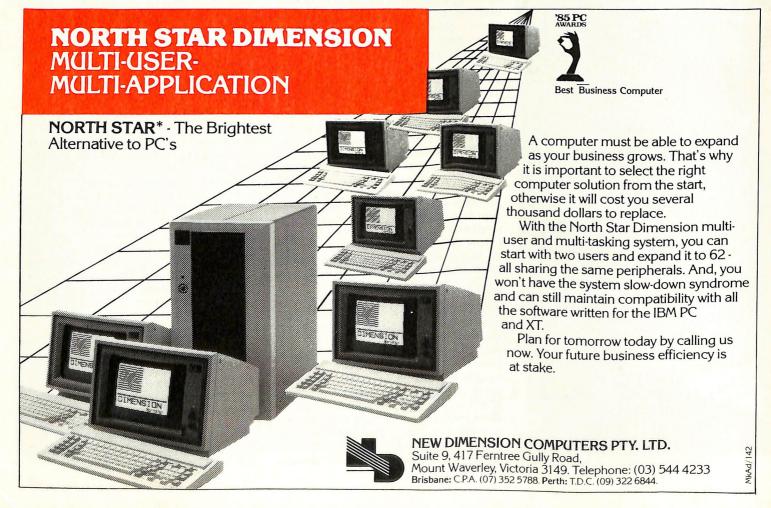
Let's be blatantly honest about all this. When my dad bought me a train set for Christmas we all knew who the present was for. When you buy a computer-type present for the kids, level with them that you'd like to play with it too. They'll appreciate the gift that much more. Sharing is half the fun. Besides, you'll feel less guilty.

Really young children also appreciate a computer. Youngsters from four to seven can enjoy and benefit from Spinifex Software's Number Detective, a colourful and very well designed educational program for the Apple IIe, IIc and II+. It enables children to investigate fundamental counting, adding, subtraction and even set concepts. Another great Australian product, it's available from the Logic Shop for $64.95. It's also in Apple Computer's promotional Christmas bundle, which could

MkAd/142

save you $10 off the regular retail price.

Slightly older children with access to Apples can enjoy a logical challenge — like Rocky's Boots. You can assemble on-screen 'logic circuits' which do fun things, and teach basic principles of logic 'to boot' — great for children of nine years and up. Rocky's Boots is available in disk form from Ashtron Software for $69.95.

While talking Apple, it seems the current most popular game at Mount Crisis is Choplifter, a colourful helicopter rescue mission with great graphics — but you'll need a joystick for this one. Choplifter is simple in concept, but sometimes it's the simple systems which live longest. Imagineering should have it. There's also a cartridge version ($55) for the Commodore 64, available from High Technology.

If you don't mind the youngsters fooling around with your PC compatible, then all of them (yourself included) would enjoy Microsoft's Decathlon. This is a neat competitive game involving track races, hurdles, high jumping, shot-put and so on. Your fingers will ache afterwards, but they

sure will develop muscles. Available from Software Source for $61.

For a swag of ideas on cheap computers why not consult the August edition of YC for our review of workable, but cheap (under $1000) machines? Check out the Sinclair QL, the Sega, the Microbee and the Amstrad. I understand there are a few Commodore 64s going cheap if you know where to look. And despise not the VIC-20; look for secondhand bargains — a 'used' computer is a 'proven' computer.

For the kids who are into more serious pursuits than games, there are packages like Typequick. This product won the Australian Software division of our last PC of the Year Awards. It's a typing tutor available for CP/M, Apple DOS, and PC-DOS or MS-DOS machines. If your child has started to write essays he/she needs this now. I'm a firm advocate of teaching children to type; it's a skill they'll always value and thank you for. Children aside, if you can't type, buy this for yourself — it's $77 from Aid Systems, 14 Cecil Street, Gordon 2072.

Finally, Uncle Phil has now come clean and told the world that his Magnum Opus is the Speedit programmers' workstation. If your teenager is about to lurch (hopefully) into tertiary education, he or she will be confronted by computers at every turn. Give them an advantage by buying them a copy of Stylus (the new name for Speedit). It's a language-independent program design system with enough help screens to teach the principles of structured programming. It runs on PCs and compatibles, colour or mono. Great Aussie software.

What to Give Your Spouse

Remember that crazy television ad with Mom doing the banking in a hot rod and crash helmet? Now she can crash about at home, doing the banking through Viatel. You'll need to buy her the right gear, however. If you share a matrimonial PC, then try DataNetComm's In-Modem. In addition to a regular 300/300 baud mode, it supports Viatel's 1200/75 split system and comes with software to access Viatel. Alternatively, if your spouse is computer- ▶

To: SUE
FROM: LES xx

Get a buzz out of home banking, with the Beemodem.

less, then maybe the right gift is a colour Microbee with the incredibly low-priced Beemodem ($189.50). You'll also need the $49.50 Microbee/Viatel hardware/software 'option'. These add-ons make the Bee a very attractive unit for domestic computing.

I've always been at a loss to find a convincing reason for having a 'domesticated' computer. The Viatel connection is a pretty good excuse; so too is word processing. Although the most popular Bee is based on a steam-driven 8-bit Z80, it still packs a wallop. It handles graphics and word processing like a breeze. Use it for making notes, writing letters, and your memoirs. But *please* keep it out of the kitchen. Stick to recipe books or card collections. Gravy in the keyboard is an almost terminal (sic) complaint.

Giving the spouse a Microbee is really a gift for the whole family. It is packed with educational software and games. Your children probably use Bees at school — and it's from Oz.

If your hardware is the AWA-Thorn Amstrad, then just maybe you might give your spouse the $52.20 Home Budget cassette. That's a mighty cheap accounting package. Mrs Lee has a much more down-to-earth approach — I balance the books manually.
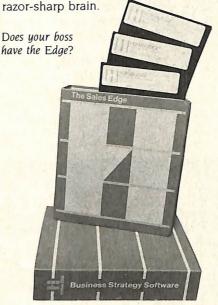
What to Give Your Mother-In-Law

Contrary to popular opinion, mothers-in-law are not universally objects of opprobrium. Some are actually loved and respected by their respective children-in-law. So we're resisting the temptation to do another mother-in-law send-up. It's Christmas.

Mothers-in-law are not excluded from the high-tech revolution. Your budget may not stretch to a new computer for her, but how about a computer-based chess game? Or a telephone with a programmable

memory? And if she does have a computer (I know some who do), how about a document holder, or a lockable floppy disk box, or even a pack or two of floppy disks? Consumables are also a good idea; things like new ribbons for her printer, or a set of fancy daisywheels if she's into word processing. How about a disk-cleaning outfit?

What's right for your mother-in-law could also be just the thing for Great-Aunt Maude. Older folk aren't necessarily mindless. Far from it. I know at least one great-grandmother who can lick the pants off her computer chess game — and at level seven! Behind that wrinkled brow is a razor-sharp brain.

Does your boss have the Edge?

The Sales Edge
Business Strategy Software

What to Give Your Boss

I guess it all depends on how you relate to your boss. The majority of bosses known to me consider themselves fortunate if they receive just a polite Christmas card from their employees. In a small organisation with only a handful of employees who work closely with each other things could be different. Here are a couple of ideas anyway.

For starters, software isn't a bad gift. Consider it an investment, or a broad hint that the company really needs a personal computer. The Sales Edge (for MS-DOS machines) will set you back $495 — but that could be reasonable for a small staff syndicate. It's available from Human Edge Software Corp in Melbourne. It's an 'expert system' which helps a salesperson tailor the 'sales pitch' to suit the 'prospect'. Its smaller brother, Mind Prober, is similar, but is the basis of a great party game. The

same folk will sell it to you for $64.95, to suit the Commodore 64 or MS-DOS machines. I reviewed both products earlier this year. Just be sure the boss doesn't use Mind Prober to do a fiendish inquisition on your innermost self.

What to Give Your Secretary

Whatever you give her (it could be a 'him'), chances are it's really a gift for the business — unless, of course, it's a bottle of French perfume or a box of chocolates. If it's at all related to computers (as it must be for the purposes of this article), then try to make it something which will make her/his life at the office that much more pleasurable — and hopefully productive.

Right now I'm sitting on my favourite chair belting Ron's keys. The chair is a Norwegian Hag. It has no back, and you kneel on it rather than sit. The idea is that it prevents bad posture and the resulting back ailments. I find it very comfortable, although it took a little time to get used to the pressure on my knees. This particular item runs to about $250, and is obtainable from McEnnally Office Furniture in Crows Nest (Sydney). Other models are available — all very ergonomic

Assuming she/he has a computer for correspondence and record keeping, how about making up some personalised flop-

Start at the knees, please (Balans chair from Design Partners).

That old standby: the IBM PC.

py disks as a thoughtful (but very inexpensive) gift. You can buy bulk unlabelled disks in lots of 100. You then have some stick-on labels prepared with her/his name embossed, and an appropriate thought, or space for annotation. Finally, format them all (that's really being thoughtful), then box them neatly for presentation. Try Video Com Australia (02) 525 8165; its SKC disks are so great I use the single-sided version for all double-sided applications — and haven't lost one yet. Data Distributors (03) 534 8312 has a similar deal on Verbatims.

Some office workers have a hangup about VDU screen radiation. As an ex-physicist, I really think it's a lot of baloney. Your domestic colour television poses far more of a radiation 'hazard' than a VDU, especially if it's a monochrome VDU. Even RGB monitors offer little radiation, since the total screen illumination is only a small fraction of the total screen area.

Nevertheless, I've seen secretaries scared witless by their VDUs. One I know of keeps it about four feet away from her keyboard to minimise the 'risk'. If she

keeps this up she's going to need binoculars. So if your secretary has queasy feelings, give her a slab of lead glass to prop up in front of the screen. Of course, the VDU display tube is already made of lead glass, but at least you'll have made someone feel a bit safer. A more practical gift would be an anti-glare screen to reduce reflections from office and window lighting.

Incidentally, many PC-compatible monochrome screens are being driven by the colour composite video output from certain RGB cards. This means the monochrome screen has the same resolution as the colour screen, which is somewhat lower than that of a standard monochrome-only card. The logic here is that 'one day real soon now we will replace the mono screen with colour'. That day may be a long way off. Meanwhile, your secretary will thank you if you install a mono card (instead of the RGB card) and use a real TTL monochrome (not composite) monitor. The characters will be sharper and easier to read. Give him or her the choice of green or amber. If you can run to a graphics mono card, so much the better;

many packages can make use of those extra facilities.

As a final touch, how about a tilt-and-swivel stand for the display screen itself? The screen can then be angled to avoid difficult reflections, and to improve the posture of the operator.

What to Give Your Small Business
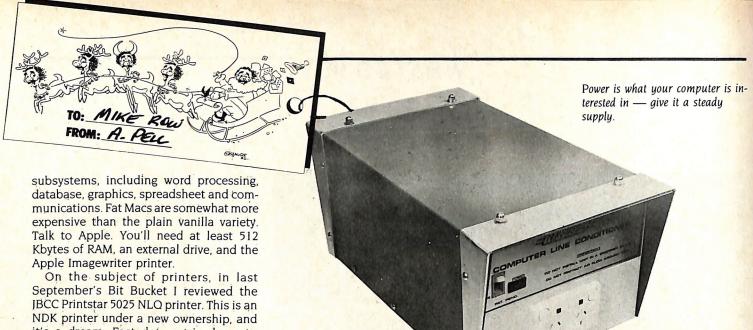
In short, just what we recommended for your secretary. But then 'presents' for a business are really income producers, so here's where you can splurge with a clear (almost) conscience. If your small business hasn't got a computer (I don't believe it!), go get one. Now. Why haven't you got one? The standard excuse is that if I buy one now it'll be obsolete in 12 months' time. So what? You've by then had twelve months of improved productivity and developed software which will be used for years to come.

What to buy? Quite frankly, buy a computer which has the greatest selection of *useful* software. We all know what that means; the choice is PCs, PC compatibles or Macs. I put my money on the PC compatibles; they work like the Real Thing and cost less. If your small business is not into risk taking, go for True Blue and make it an IBM. But consider carefully the pros and cons.

If your business computing applications are mainly word processing and record keeping, then a regular PC (possibly with a hard disk) is probably the answer. If you're into number crunching, such as engineering applications, market research statistics, simulation or scientific research, go for eight cylinders — the IBM PC AT, or one of the many workalikes. Since so much of my computing is compile-link-execute, I would like to upgrade Ron to AT level (rather than trade him in — he's too much part of the family now). It can be done — at a hefty price, however. The Microprocessor Applications Bullet-286-1 board at $2754 does the job, but you'll need to add your own RAM chips; you can go to 1 Mbyte. Alternatively, try President's 20-meg AT clone at $9080 — a giant step for a person, but peanuts for a company.

You've possibly noted that I'm not a Mac fanatic, but now it's got Jazz playing for it, I consider the Mac to be a respectable member of the small business office community — Fat Mac, that is. Lotus Corp's Jazz is really Macsymphony, retuned for mousing around with icons. Jazz retails at Imagineering for $895, but it's very, very nice; it features the usual gamut of integrated ▶

Jazz up your office with a Mac.

TO: _MIKE ROW_
FROM: _A. PELL_

Power is what your computer is interested in — give it a steady supply.

subsystems, including word processing, database, graphics, spreadsheet and communications. Fat Macs are somewhat more expensive than the plain vanilla variety. Talk to Apple. You'll need at least 512 Kbytes of RAM, an external drive, and the Apple Imagewriter printer.

On the subject of printers, in last September's Bit Bucket I reviewed the JBCC Printstar 5025 NLQ printer. This is an NDK printer under a new ownership, and it's a dream. Fast dot matrix down to selectable font near-letter quality, it could well handle all of a small business's printing needs, from correspondence to invoices and graphics. It's available from Datascape in Mosman — phone (02) 969 2699 — for $2438 (excluding tax). You can then give the printer a Christmas present of a sheet feeder (about $1300) and a tractor feed ($200).

Another present (for the secretary or the business) is tried-and-true Wordstar 3.3. I've been through Wordstar 2000 and greatly prefer the original. Maybe I'm getting old, and prefer things from the good old days, but Wordstar 3.3 is great once you've made the investment of a long learning curve. I've been using it since it was first released — and I'm still learning. It managed to set the standard for control key functions for many other word processors; you'll find them in products as diverse as Sidekick and dBase.

You can then give Wordstar a present itself: Smartkey from FBN Software (another Australian company) for just $77. It enhances your keyboard like wow.

What to Give Your Computer

Subscription orders. But seriously, folks — what we really mean is what to give *your* computer — not the greatly deserving, highly overworked staff and journalists of this august publication.

What would *your* computer like? How about some elegant hardware add-ons? I know Ron cringes in fear when the thunder rolls around Mount Crisis. One decent lightning zap and the power here quietly disappears for a few seconds, and just when Ron is dumping a buffer to the hard disk. That's unkind to hard disks, since it has a tendency to scribble over all the important bits between blocks of records. With that kind of problem you don't just lose the file — you effectively 'unformat' selected portions of the disk. That's nasty. Apart from losing the current data, you may have to recover the entire disk from

backup files, and also reformat the disk.
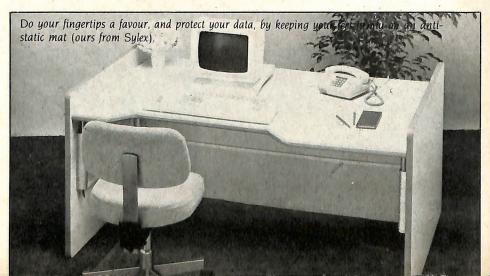
The ideal gift would therefore be a UPS — an uninterruptible power supply. These goodies range in price from a few hundred to a few thousand dollars, depending on (a) the power required and (b) how long you want the system to hold up until you can power down hygienically. Generally, they consist of a large storage battery with a charger on one side, and a DC to AC inverter on the other. The inverter is basically a 50 Hz oscillator with a whopping great power amplifier generating 240 volts at the desired power level. It must also withstand wide fluctuations in loading. A UPS is quite distinct from a surge suppressor. Surge suppressors simply scrape spikes off the mains supply — a useful function if your micro is close by your great aunt's spot welder — and they are much, much cheaper.

Failing the funds necessary to buy your micro a UPS, how about a static electricity stopper? On some days you can generate really high voltages (thousands) just by strolling across the carpet on your way to the computer. If you're unlucky (and Murphy says you will be), the static discharge

from your fingers to the micro can cause damage ranging from the temporary loss of a few bits in RAM to downright destruction of chips. One simple solution is to spray the floor surrounding the micro with water. That's fine if your micro is in the fowl yard, but most of us work inside. A more elegant solution is to use one of the readily available anti-static aerosol sprays on the carpet, which makes it sufficiently conducting to prevent a charge build up. Alternatively, use a conducting mat which will meet your feet before your fingers meet the micro. One very simple solution is to connect the mains ground to your chair via an inconspicuous wire — provided the chair has some metal parts. Just don't trip over the wire.

A super-cheap present for your computer would be a clear-plastic dustcover for the keyboard; just be sure the material doesn't generate other problems through static electricity. Poor old Ron only gets a tea towel tossed over him for the night.

Ron just might get an 8087 numeric co-processor for Christmas. Although much of his time is spent word and character crunching, I occasionally let him loose on

Do your fingertips a favour, and protect your data, by keeping your feet firmly on an anti-static mat (ours from Sylex).

TO: FRANK
FROM: FRANK

"For me? Oh I shouldn't have." Buy yourself a T1100 — nobody else will.

astronomical programs. One in particular is very CPU bound — it solves Kepler's equation for comet and planetary orbits using iterative techniques and also works in double precision. An 8087 could make a big difference here.

Finally, if your computer hasn't yet got his/her full complement of RAM, maybe now's the time to fill 'er up, so to speak; 64 Kbit chips have crashed in price to an all-time low. Unfortunately, the 256 Kbit chips are still a bit pricy, and some computers need these in preference to the 64s. Again, shop around. You may well need an expansion card to hold the extra RAM, rather than filling up empty sockets on a motherboard. If you are heading in that direction, be sure to buy a board with enough sockets to fully populate the machine. You don't have to buy all the chips at once — just enough to make the computer feel loved. Then as prices drop further you can do the right thing when the time is right. Expect to pay somewhere between $1 and $2 per Kbyte installed. On the other hand, a set of nine 64 Kbit chips (200 ns) currently retails for just $4 in the United States. That's under $6 (Australian) for 64 Kbytes! I easily remember when 16 Kbytes of core memory set one back $4000.

What to Give Yourself

This is a tough one, too. After all, someone else may give you just the very thing. So why not wait until early in the new year, apologise to yourself for being late, and look for the bargains. If you've got the loot, splurge and get a PC AT (or a compatible). Alternatively, how about that neat lap-top Toshiba T1100? There's a real thought — and it's the thought that counts. I reviewed the T1100 in September's YC. And like the ad says: "I liked it so much, I bought it" — the computer, not the company. I made a point of getting on with the optional serial interface installed and have been able to use Modem7 to transfer files from Ron to the Toshiba's itty 9 cm diskettes. Maybe I'll splurge on extra RAM for my next birthday. next birthday.

But soft! What happens after Christmas? Unwanted presents, that's what happens: non-computing spouses who have been given add-on cards for non-existent computers; kids with Open Access systems which don't seem to run on their Apples; great-aunts with non-interruptible power supplies, who don't see why they need one for their electric toaster; Commodore tiddlies by the score; Apples by the barrel load; and maybe some Big and Little Macs.

The message is — watch the classified advertisements in late January. You'll be amazed at the bargains resulting from unwanted Christmas presents. Home computers will be among the most popular presents this year, as they have been in the United States for many years, and many recipients just aren't interested. We know you're interested, otherwise you wouldn't be reading this — would you?

Naturally, you don't want to spend too much on yourself. So how about some inexpensive software — something to fill out the empty spaces in your stocking? If you're an IBM PC (or compatible) owner you've just got to get one of the pop-up desktop utilities. I've been using Borland's Sidekick now for some time, and I wouldn't be without it. Right now Sidekick has quite a few competitors, and most of them inexpensive. Judging from the ads, they build on the original Borland idea with neat goodies like an alarm clock, simple card file systems, and all co-resident with your 'normal' software. A good example is Amber Systems' Homebase. Homebase has the Sidekick functions (calculator, notepad, auto-dialler, calendar) plus database, alarm clock, multiple phone directories, hotkeys, diary, to-do list, background electronic mail, mailing label printer and a 'screen saver'. Not bad for $(US)49.95.

Finally, if the kids, your spouse, or your great-aunt missed out on the Microsoft Flight Simulator, buy yourself one — but be sure to buy a proper joystick for the PC version. The Flight Simulator manual gives full instructions for modifying joysticks for throttle and joystick controls. Then try flying down Madison Avenue, across the financial district of Manhattan Island, between the twin buildings of the World Trade Centre and, finally, do a lazy turn around the Statue of Liberty before heading back to JFK Airport for a three-point landing. It's available from Imagineering for around $90 for a variety of machines, but shop around.

... and (the Great Ed will destroy me if I don't say this) get into a subscription for your favourite (meaning this) computer magazine, thereby treating yourself to a year of Christmas giving.

A happy high-tech Christmas to one and all. □

Don't get carried away with Microsoft Flight Simulator — still one of the most exciting things you can do with your computer.

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Apple Macintosh 128 Kbyte and 512 Kbyte

FREQUENCY HISTOGRAM

This business/education program plots a frequency histogram of a set of data after calculating the maximum and minimum data elements and determining the appropriate 'rounded' values and a suitable class interval.

It gives the user the option of saving the histogram to a Macpaint document, which may then be enhanced using Macpaint tools before being pasted into a Macwrite document. You can run an immediate printout of the histogram by pressing SHIFT CLOVER 4 (note the Macpascal drawing window can't be saved directly to a Macpaint document using SHIFT CLOVER 3).

Philip Cookson,
Northcote, Vic

```
program Frequency_Histogram (input, output);

{ Author : Mr. Philip Cookson          Date : 10th September, 1985 }
{ This program reads a set of data  and produces a frequency histogram   }
{ of the data. It automatically calculates 'neat' class intervals for  the }
{ histogram and sorts the data into the appropriate class intervals. The  }
{ histogram is then displayed in the drawing window.                      }

  const
    maxarraylength = 200;  {maximum length of the data array}
    maxnclass = 11;  {the maximum number of class intervals that can be generated}

  type
    data = array[1..maxarraylength] of real;
    freq = array[1..maxnclass] of real;

  var
    i : integer;
    xdata : data;
    xfreq : freq;
    xmin, xmax, classwidth : real;
    nclass, ndata : integer;
    response : char;
    title, filetitle : string;
    SaveTextRect : Rect;

  function log10 (x : real) : real; { Evaluates the logarithm to base 10 of x }
  begin {log10}
   if x < 0 then
     writeln('Invalid Argument')
   else
     log10 := ln(x) / ln(10)
  end; {log10}

  procedure InitTextWindow;  { Initialize Text Window }
   var
     TextRect : Rect;
  begin {InitTextWindow}
   SetRect(TextRect, 0, 20, 525, 340);
   SetTextRect(TextRect);
   ShowText
  end; {InitTextWindow}
  procedure ReadTitle (var title : string);
  {Reads Histogram Title from the input file}
   begin {ReadTitle}
    write('Enter a title for the histogram : ');
    readln(title);
    writeln;
   end; {ReadTitle}
```

Apple Macintosh 128 Kbyte and 512 Kbyte

```pascal
          procedure ReadData (var x : data;
                  var n : integer);
      (Reads data from the input file interactively.  Note the use of the boolean )
      (variables and the input pointer, to overcome Pascal's interactive input   )
      (limitations. )
        var
          lineread, fileread : boolean;
      begin (ReadData)
       n := 0;
       writeln('Enter the data (Enter  Q  to terminate data entry)');
       fileread := false;
       repeat
        lineread := false;
        repeat
         write('x[', n + 1 : 1, '] = ');
         if eoln then
          lineread := true
         else if (input^ = 'Q') or (input^ = 'q') then
          begin
           fileread := true;
           lineread := true
          end
         else
          begin
           n := n + 1;
           readln(x[n])
          end
        until lineread or (n = maxarraylength)
       until fileread;
       readln;
       writeln
      end; (ReadData)

      procedure FindMaxandMin (var x : data;
                  n : integer;
                  var xmax, xmin : real);
      ( Determines the maximum and minimum of the input data array )
        var
         i : integer;
      begin (FindMaxandMin)
       xmin := x[1];
       xmax := x[1];
       for i := 2 to n do
        begin
         if x[i] > xmax then
          xmax := x[i];
         if x[i] < xmin then
          xmin := x[i]
        end;
      end; (FindMaxandMin)
```

Apple Macintosh 128 Kbyte and 512 Kbyte

```
procedure DetermineClassIntervals (var xmax, xmin : real;
            var nclass : integer;
            var classwidth : real);
{ An algorithm to determine 'neat' class intervals for the frequency }
{ histogram. It returns neatly rounded values for 'xmin' and 'xmax', }
{ and computes appropriate values for 'nclass' and 'classwidth'.     }
 const
   epsilon = 1.0e-7;
 var
   newxmin, newxmax : real;
   range : real;
   i, iclass, jclass, iorder : integer;
 function power (x : real;
            a : integer) : real;
{ determines the value of ' x raised to the power a ' }
{ for integer values fo a                             }
   var
     i : integer;
     product : real;
 begin (power)
  if x = 0 then
    power := 0
  else
 - begin
     product := 1;
     if a > 0 then
      for i := 1 to a do
        product := product * x
     else if a < 0 then
      for i := 1 to a do
        product := product / x;
     power := product
   end
 end; (power)

 function convert (i : integer) : integer;
{ Used to determine the appropriate number of class intervals }
   begin (convert)
   case i of
    1 :
     convert := 1;
    10 :
     convert := 10;
    2, 5 :
     convert := 5;
    3, 6 :
     convert := 6;
    4, 8 :
     convert := 8;
```

Apple Macintosh 128 Kbyte and 512 Kbyte

```
        7 :
          convert := 7;
        9 :
          convert := 9
      end
  end; (convert)
  begin (DetermineClassIntervals)
   range := xmax - xmin;
   if (range <> 0) then
    begin
     iorder := round(log10(range));
     iclass := round(+0.5 - epsilon + range / power(10, iorder));
     jclass := convert(iclass);
     classwidth := iclass * power(10, iorder) / jclass;
     while range <= classwidth do
       classwidth := classwidth / 10;
     newxmin := round(-0.5 + epsilon + xmin / classwidth) * classwidth;
     newxmax := round(+0.5 - epsilon + xmax / classwidth) * classwidth;
     if xmax = newxmax then
       newxmax := newxmax + classwidth;
     while xmin >= (newxmin + classwidth - epsilon) do
       newxmin := newxmin + classwidth;
     while xmax < (newxmax - classwidth) do
       newxmax := newxmax - classwidth;
     xmax := newxmax;
     xmin := newxmin;
     nclass := round((xmax - xmin) / classwidth)
    end
   else
    begin
     nclass := 1;
     classwidth := epsilon
    end
  end; (DetermineClassIntervals)

  procedure SortintoClassIntervals (var x : data;
              ndata : integer;
              var xfreq : freq;
              xmax, xmin : real;
              classwidth : real);
( Sorts the data into the appropriate class intervals.  Note that the )
( data does not have to be ordered in any way.   )
   var
    i, k : integer;
  begin (SortintoClassIntervals)
   for i := 1 to maxnclass do
    xfreq[i] := 0;
```

```
for i := 1 to ndata do
  begin
  k := 1 + trunc(abs(x[i] - xmin) / classwidth);
  xfreq[k] := xfreq[k] + 1
  end
end; {SortIntoClassIntervals}

procedure PercentageFrequency (var xfreq : freq;
           ndata : integer);
  var
  i : integer;
begin {PercentageFrequency}
  for i := 1 to maxnclass do
  xfreq[i] := xfreq[i] * 100 / ndata;
end; {PercentageFrequency}

procedure InitDrawingWindow;
{ Initialize Drawing Window }
  var
  DrawRect : Rect;
begin {InitDrawingWindow}
  SetRect(DrawRect, 0, 0, 532, 362);
  SetDrawingRect(DrawRect);
  ShowDrawing
end; {InitDrawingWindow}

procedure DrawHistogram (frequency : freq;
           nclasses : integer;
           mindata, classwidth : real;
           title : string);
  const

  Ftop = 60;              { coordinates for Histogram Frame }
  Fbottom = 300;
  Fleft = 35;
  Fright = 475;

  var
  Frame, Bar : Rect;
  i, width, Bleft, spacing, ndp : integer;

  function iscale (x : real) : integer;
  begin {iscale}
    iscale := Fbottom - round((Fbottom - Ftop) * x / 100)
  end; {iscale}
begin {DrawHistogram}
  InitDrawingWindow;
  TextSize(12);
```

Apple Macintosh 128 Kbyte and 512 Kbyte

```
            TextFace([bold]);
            MoveTo(Fleft + round(((Fright - Fleft) - 8 * length(title)) / 2), Ftop - 20);
            DrawString(title);
            TextSize(9);
            TextFace([]);
            width := round((Fright - Fleft) / nclasses);
            SetRect(Frame, Fleft, Ftop, Fright, Fbottom);
            for i := 1 to nclasses do
              begin
                Bleft := Fleft + (i - 1) * width;
                SetRect(Bar, Bleft, iscale(frequency[i]), Bleft + width, Fbottom);
                FillRect(Bar, gray);
                MoveTo(Bleft, Fbottom);
                LineTo(Bleft, Fbottom + 5);
                FrameRect(Bar);
              end;
            MoveTo(Fright, Fbottom);
            LineTo(Fright, Fbottom + 5);
            FrameRect(Frame);
            for i := 0 to 10 do
              begin {Label Vertical Axis}
                spacing := round(i * 10 * (Fbottom - Ftop) / 100);
                MoveTo(Fleft - 30, Fbottom + 3 - spacing);
                WriteDraw(i * 10 : 3);
                MoveTo(Fleft - 5, Fbottom - spacing);
                LineTo(Fleft, Fbottom - spacing);
              end;
            ndp := round(-log10(classwidth));
            if ndp > 8 then
              ndp := 8;
            if ndp <= 0 then
              ndp := 1;
            for i := 0 to nclasses do
              begin {Label Horizontal Axis}
                MoveTo(Fleft - 25 + width * i, Fbottom + 20);
                WriteDraw(mindata + i * classwidth : 8 : ndp);
              end;
          end; {DrawHistogram}

        begin {Main program body}
          GetTextRect(SaveTextRect);
          InitTextWindow;
          ReadTitle(title);
          ReadData(xdata, ndata);
          FindMaxandMin(xdata, ndata, xmax, xmin);
          DetermineClassIntervals(xmax, xmin, nclass, classwidth);
          SortintoClassIntervals(xdata, ndata, xfreq, xmax, xmin, classwidth);
          PercentageFrequency(xfreq, ndata);
          write('Do you wish to save the Histogram to a MacPaint file [Y/N]? ');
```

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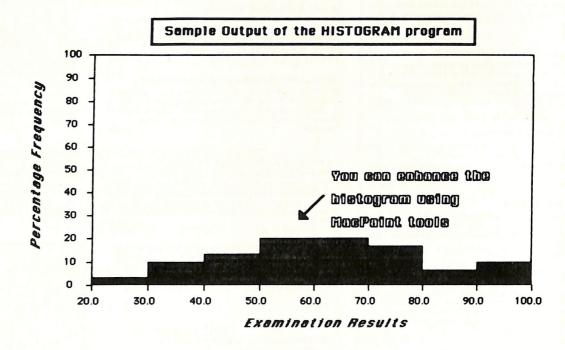
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Apple Macintosh 128 Kbyte and 512 Kbyte

```
      read(response);
    if (response = 'Y') or (response = 'y') then
      filetitle := NewFileName('Save drawing to :');
    InitDrawingWindow;
    DrawHistogram(xfreq, nclass, xmin, classwidth, title);
    if (response = 'Y') or (response = 'y') then
      SaveDrawing(filetitle);
    SetTextRect(SaveTextRect);
  end. (Main program body)
```

Sample Output of the HISTOGRAM program

You can enhance the histogram using MacPaint tools

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PROGRAMMER'S WORKBENCH

Guidelines for Developers

This month, a few words to programmers writing software for personal computers and micros: the times, they are a-changin', as are our machines, so we now need to pay more attention to programming than ever before.

Back in the bad old days, when micros mostly ran CP/M 2.2, programming was fairly straightforward: machines were single-user, single-tasking, with no requirement for sharing resources. A lot of problems are now emerging when we run programs designed for the old environment on machines with more advanced capabilities. Networks and multi-user or multi-tasking operating systems, for instance, work well when running software designed for that environment, but are sometimes less successful when running standard CP/M or DOS software. Let me give you some examples.

Wordstar, as you all know by now, is by far the best word processor ever written (cries of "shame") or, at least, is very popular. It was originally written for CP/M and subsequently adapted for CP/M-86 and MS-DOS, and works well in those standard environments.

Over the years, I've had experience running Wordstar in a variety of systems under virtually all variations of the CP/M and DOS operating systems. There are problems, which aren't unique to Wordstar, but are characteristic of most single-user software.

Let's look first at file sharing. Suppose two users on a multi-user system under MP/M II, MP/M-86 or Concurrent try to edit the same file at once. Multi-tasking versions of CP/M maintain a list of open files internally, and, unless the compatibility attributes have been set, won't allow two programs to access the file at the same time.

This mode of operation is fail-safe: the first user can edit the file normally, but the second user will get an error message and be unceremoniously dumped back to the operating system prompt. But what happens if the file is some program source which one programmer is editing and a second wants just to examine or print out? There's no risk of the file being corrupted,

With the pleasant days of single-tasking, single-user software development rapidly fading, Les Bell speeds up the pace a bit and comes up with a few hot tips for multi-user software developers.

---

but the second user still can't get access to it.

This situation occurs all too frequently in our office. I might be editing a source code file, then decide I'd like a printout of the old version (which I could easily do by switching virtual consoles and invoking the print spooler), but it won't work.

This much I can accept, but once you've finished editing a file using Wordstar and have gone back to the opening menu, Wordstar doesn't close the file completely, so MP/M or Concurrent keeps it on the list of open files. Even though you might not be editing the file and, as far as you're concerned, it's closed, other users still can't get at it. A rule for users is, therefore, quit after editing every file.

Better still would be a rule for programmers saying "I will close all files after using them so the operating system won't lock other users out". The problem with Wordstar is it only has to read the input file, never to write to it, which means there's no need to close it in the CP/M and DOS environment because it hasn't been changed. But multi-user systems rely on the close operation to tell them you're finished with the file and someone else can now have it.

This problem isn't confined to the MP/M and Concurrent operating systems; any well thought-out operating system will behave in the same way. If a process hasn't closed a file, the operating system has to assume it's in use.

To prove this system can work, and work well, look at 'New Word', New Star Software's Wordstar workalike program. On a multi-user system, this handles open and close calls correctly and, should a second person try to open a file already in use, it will alert the user to the fact, but allow read-only access to the file, disabling all keys which would actually edit the file.

The question of which process owns a system resource doesn't only apply to files; it applies to other resources, such as communications ports and printers, as well. When Wordstar first accesses the printer, for example, the operating system marks the printer as 'owned' by that program. No other program can use the printer, until Wordstar releases it or it quits running.

Imagine coming in one morning and using Wordstar to print a document, which you then spend some hours examining. Unless you exit Wordstar, you've tied up the printer for all that time (which you'll discover when another user hits you).

This is quite logical; just because your program hasn't printed a character for two seconds doesn't mean it's finished with the printer. The operating system must not allow another program to start printing in the middle of your output and vice versa.

Some programs designed for multi-user systems have another bad habit: they ask the operating system to give them the printer in case they need it and, even though you might not actually print anything, you 'own' the printer and no-one else can use it.

Programs such as dBase 2.41 suffer another problem not shared by networks: needless consumption of system resources. Under CP/M there are a couple of different system calls which will input a character from the console, as well as the direct console I/O call, number 6.

Call 1, Console Read, simply waits for a character to be input, and doesn't return to the calling program until a key has been pressed. During this time, MP/M and Concurrent CP/M won't run the calling program, giving the spare time to other programs instead.

If a program uses the Console Status call, however, it will loop around and

around, never giving the operating system a chance to suspend the calling process, yet using up CPU cycles. dBase does this, which is one reason why it's a real killer on multi-user systems. We have a patch for version 2.4 which fixes it, but the console I/O code of 2.41 is particularly opaque, as I mentioned last month.

The upshot of all this is that while some programs, like Wordstar, hardly have any impact on a multi-user system at all; others, like dBase, can cripple it. To give a concrete example: I am able to run five copies of Wordstar, each responding instantly to keystrokes, while simultaneously performing a 19.2 Kbaud file transfer with no problems at all. But as soon as someone starts running dBase on the system, everything slows down noticeably.

Incidentally, it's surprising how much spare capacity even quite a modest system has. I recently tried a program called Tach, which is rather like the economy gauge on some cars. It shows the percentage of CPU idle time on a bar graph, and I discovered that most of the time my Compupro CPU has more than 75 per cent idling capacity. I'm now finding it hard to justify buying an 80286 processor!

So, a plea to all software developers: if you think your software might be used on a multi-user or network system (one of the beauties of Concurrent DOS is its ability to run off-the-shelf CP/M and DOS software), please close files explicitly and leave room in your design for operating system calls to attach and release system resources as appropriate, and please don't waste CPU resource in useless loops.

And advice for purchasers of multi-user systems and networks: before you buy, ask the supplier how the system copes with these issues. Once someone starts printing something, can they be interrupted? If not, when can the next user take over the printer? And most importantly, how about file sharing and security? Don't find out too late, and don't be surprised if the supplier has never thought about it.

Portability To New Architectures

On the subject of programming techniques and methodologies: the release of the AT last year has caused a few hiccups for some software suppliers, who are trying to make their programs look as glossy as possible by using direct hardware access to provide colour graphics, sound and other bells and whistles.

In some cases, programmers used direct hardware access or ROM BIOS for tasks

that the operating system could have performed. In most cases, the reason for this was the desire for speed.

Such practice ignores the fact that the primary reason for the existence of the operating system today is to provide the programmer with a library of support functions which will operate correctly, regardless of the hardware architecture they're running on. Bypassing the operating system or duplicating its functions places the programmer and, by extension, the user, at the mercy of changes in the hardware environment.

Sooner or later, you'll want to upgrade, typically from a PC to an AT, and suddenly your software will stop working. It's not a good feeling.

In some cases, the problem could have been avoided by simply using the operating system the intended way, rather than duplicating its functions. In some cases, particularly with graphics software, the functions were not present in the operating system anyway.

Those times are over now. Hardware-independent graphics drivers have been available for some time in the form of Digital Research's GSX (Graphics System Extension), which is available for CP/M-80, CP/M-86 and PC-DOS. GSX, the result of collaboration between DRI and GSS (Graphics Software Systems, a mini-computer graphics company), implements the GKS (Graphical Kernel Standard) and will drive all kinds of hardware, such as the IBM PC screen, external graphics terminals, printers, plotters, digitisers and mice.

IBM has now officially entered into its own agreement with GSS to supply GKS drivers for the PC; the IBM GKS drivers will support the new ES (Engineering/Scientific) graphics card and will be suitable for high-quality work.

There have been complaints about the slowness of the GKS drivers, so smart programmers are developing in modular languages and making sure the device-specific parts of their code are layered into modules which can be quickly replaced if required. They're using operating system services wherever possible, in C in many cases, in view of a possible move to Unix in the future.

IBM itself has been encouraging these moves for several reasons. The move from DOS 2.1 to DOS 3.0 and 3.1 caused some hiccups for people doing things in non-portable ways, and the move from the PC to the AT caused even further problems.

Future PC operating systems will in-

corporate multi-tasking, which will create trouble with direct hardware access; and if IBM releases its own operating system to replace PC-DOS it will have to cope with PC-DOS programs behaving in a predictable, regulated way.

The result, in theory, will be much more portable software which is simpler to install and will run on a more diverse range of hardware. In practice, most companies will continue to use heavily hardware-specific copy-protection schemes, which will negate the benefits of portability. *'Plus ca change, plus c'est la meme chose.'*

Glossary

Compatibility Attributes: In MP/M and Concurrent CP/M, it's possible to set certain bits in the filename for a program to signal to the operating system the mode in which this program will open files — exclusive or shared. These bits are called the compatibility attributes.

File Sharing: On a multi-user, multi-tasking or networking system, the ability to allow two programs to simultaneously access a file, or at least to manage things so they do sensible things if they aren't supposed to access it simultaneously.

Multi-tasking: Performing two or more tasks simultaneously on the same processor. As I write this, there are in fact 37 separate processes running on our office system (it surprised me too).

Multi-user: Capable of supporting two or more users simultaneously. A multi-user system is not necessarily multi-tasking: for example, a network can support multiple users, but it does it by having multiple single-tasking processors.

Network: A set of computers linked together in such a way that they share some resources — typically hard disk drives and printers. Computer A can access files on computer B and vice versa.

Read-only Access: This allows examination of a file with no ability to change it.

Resources: Component parts of a computer system which are shared between users, such as disk, printer, CPU.

ROM BIOS: The IBM PC's Read Only Memory Basic Input/Output System contains the low-level instructions for access to disk, screen, serial ports, and so on.

System Calls: These are the functions performed by the operating system for programs which request them. Typical calls are: get a character from the keyboard, send a character to the printer, read a block of data from a file, terminate program. □

Reviews

THE TRANS-NE

Now we've convinced you of the merits of multi-user machines, you might also care to look at the possibilities of networking. Here, Frank Lee looks at a network for interconnecting a number of IBM PCs or compatibles with sharable hardware resources.

T CONNECTION

THE CONCEPT of a local area network isn't particularly new. Varieties abound: token-passers, Ethernet clones and Cambridge rings, to mention a few.

Although it uses a low-cost method of interconnection, Trans-Net is similar to Ethernet, using the CSMA/CD protocol (a necessary abbreviation for 'carrier-sense multiple-access collision detect'). In effect, each node on the network behaves a bit like a CB-er competing for Channel 14; it's roughly first in, best dressed. If you start your transmission while nobody else is transmitting, the system is yours, but if a transmission 'collision' occurs, both parties have to try again later. Just how much later depends on what kind of system you're using.

Radiation

Ethernet confines the transmitting signals to a closed coaxial cable, which prevents leakage of RF signals into the environment and, more importantly, protects the network from external EMI (electro magnetic interference) noise. Most CSMA/CD systems follow the same physical method. By contrast, Trans-Net uses a common bus consisting of a simple twisted pair of wires (RS422 standard) with a maximum length of 1200 metres. Both ends are terminated with small 100 ohm resistors, to prevent the setting up of internal standing waves within the bus (which may lead to dead spots on the bus or result in unwanted radiation).

Twisted-pair is much cheaper than co-axial cable, and almost as insensitive to noise. Certainly at Trans-Net's bit rate of 1 Mbit per second twisted-pair wire should be a safe method, provided the node drivers are properly matched. It's also much easier to tap into than coaxial cable. In fact, many aging Ethernet systems have experienced problems with deteriorating connections, which shouldn't be a problem for twisted-pair.

All Nodes Are Equal

Physically, there's no network 'master', since all nodes are equal partners. There is no such thing as a dedicated file server; each node is a potential device for other nodes, with a long circuit card and a simple audio connector socket. A short cable with plugs at each end links the card to the common bus. Nevertheless, software is available to configure one selected PC as the network master for classroom use.

There are many benefits to be had from networking, the two principal ones being data sharing and peripheral sharing. With the Trans-Net device drivers installed, for example, a PC with only a single floppy disk drive can log onto another node's hard disk as drive C. From then on, subject to the device owner's permission, files may be used almost exactly as if the PC had that hard disk installed. The 'owner' can impose certain restrictions on particular files, such as setting them as 'read-only' or available only under password. Files or even individual records can be locked.

The system I examined had only three nodes on the bus. One had a hard disk containing Wordstar 3.3, so I was able to log onto that drive from another node as if the hard disk were physically installed. I changed directory to access the word processor, then ran a short edit operation. Although a simple test, it's also comprehensive, since the drivers must ensure the various overlays used by Wordstar are also correctly located and recognised.

Another node had a printer which could be accessed by any of the three systems. Access to shared resources such as plotters and other relatively infrequently used devices may be queued. The sharing of expensive resources is a powerful incentive for using local area networks such as this. The DOS COPY command can be used to copy files from any node to any other node as required, and you can transmit entire screens or just short communications from one node to another. Electronic mail is also supported.

Three nodes are hardly enough to test the performance of a network under load; all networks suffer a degree of performance degradation as load increases. In this case, it's not the number of terminals which affects performance, but the number of nodes which is currently competing for the bus. As more nodes generate collisions, the number of retries multiplies greatly and delays become obvious. It's possible to apply statistical analysis to a given network to predict system performance, but there's no real substitute for a live test. Theoretically, up to 255 stations may be installed on a single bus, but this is simply a reflection of the fact that individual nodes are assigned station identi-fiers using an 8-bit switch. The upper practical limit is bound to be well below 255.

Documentation

Trans-Net is manufactured by RTP Inter-groups in Taiwan, and the documentation is decidedly Chinglish, although quite comprehensive and readable. Osborne Australia was in the process of rewriting the manual when I saw the system demonstrated.

There's not much to the documentation, because there doesn't need to be; the software is menu-driven and the system is particularly simple. You can almost be unaware a peripheral isn't physically attached to your own machine. Simplicity is a major advantage in network systems,

Software

Trans-Net operates in a PC-DOS (or MS-DOS) environment and doesn't appear to be bound to a strict IBM architecture. The system demonstrated was running on Osborne PC-compatibles under MS-DOS 2.11.

Utilities available under the system include print spooling, electronic mail, a data management system, and a classroom monitor.

The classroom monitor package configures the network as a master-slave arrangement, with the teacher at the network master PC. The teacher can specify what materials are available at each student station, monitor the performance of individuals and communicate privately with each student, but student-to-student communication is disabled. The teacher can demonstrate program execution and select screens at will to one or more students at a time. Naturally, students are able to run programs at their own PCs, but the teacher may interrupt execution at any time for demonstrations or other communications.

Scanning of selected student screens at the teacher station may be handled by the system at specified intervals.

The recommended retail price for a starter Trans-Net kit for two PCs is $1590, and additional cards are $795 each. The wiring system may be purchased from Osborne Australia (phone (02) 290 1122), or may be assembled by a handyman with readily available audio system components such as speaker cabling. □

THE TI PRO-LITE PROFESSIONAL COMPUTER

An almost-IBM-compatible and a lap computer, the
Pro-Lite is a typical child of the mid-nineteen-eighties.
Frank Lee found it hard to warm to this new arrival,
not least of all because his heart already belongs to another.

I RECENTLY REVIEWED the remarkable Toshiba T1100 lightweight portable. This 4 kg 'lap' computer came very close to meeting all the requirements of my own peculiar wish-list. It was very PC-compatible, ran on rechargeable batteries, had a full 25-line LCD screen, and sported a built-in 9 cm floppy disk drive. It was a safe bet that it would not be the lone representative of this particular genre for long. True Blue compatibility combined with real portability is a saleable combination, in spite of the market's ho-hum reaction to the latest spate of me-too offerings.

In many respects, the Texas Instruments' Pro-Lite Professional Computer is very similar to the T1100. Appearances are, however, deceptive. The Pro-Lite is basically quite different.

I discovered the Pro-Lite waiting waif-like in the office for me, having been delivered of a courier the previous day. No ▶

orphan-in-a-basket this. It arrived in a handsome leatherette attache case similar to, but smaller than, that of the Hyperion. It bore the usual 'Review this by yesterday please, Frankie — from you-know-who'.

And so it arrived at Mount Crisis where it remained unopened till conscience smote me for my declining interest in Yet Another Compatible. The heftiness (about 10 kg) of the entire package was another deterrent. It was a real surprise to discover that the case contained a machine which looked very much like the T1100. Its external dimensions were roughly the same, although slightly deeper. Like the T1100, the lid which covers the keyboard hinges back to reveal a full 25-line LCD screen. There is also a single built-in 9 cm floppy disk drive. The name 'Pro-Lite' is ill-chosen; it is 25 per cent heavier than the T1000, which is quite surprising considering that the Pro-Lite contains no recharge-able batteries, nor does it have some of the standard features of the T1100. But enough of comparisons — the Pro-Lite is not another me-too. It is similar, but not the same.

Physical Characteristics

When closed, the Pro-Lite is 288 mm wide, 333 mm deep and 75 mm high. It weighs in at just on 4.8 kg, which is reasonable for a lap portable, but that is without the optional battery pack (not supplied with the review unit). When used with mains power, a separate 44 watt DC supply (no lightweight at 2 kg) plugs into the computer's rear. Expansion options such as the battery pack and a second disk drive also attach to the rear via a multi-way connector. A hinged cover on the left side of the machine opens to reveal connectors for a maximum of two 'option modules'. There are four option modules listed in the handbook: solid-state (ROM) firmware packs, a 300 baud internal modem, a sync/async serial interface, and an external colour monitor interface module.

Certain 'system' options may be installed in reserved locations just below the keyboard. These include memory expansion from the standard 256 Kbytes up to 768 Kbytes, an LCD graphics board (included with the review unit), and an 80C87 numeric co-processor.

There is a second hinged cover to the rear of the right side of the machine. This protects the built-in disk drive and a parallel printer port. There's a secondary power outlet beside the printer port, should you be using the TI Portable Printer.

As the lid covering the keyboard is raised, a spring-loaded power switch is closed, and the keyboard itself moves up to provide a 20 degree slope. The keyboard uses the standard QWERTY layout, but has little in common with the IBM keyboard. It has 12 function keys, but no numeric keypad. A single key with a LED indicator controls both the Caps Lock and Num Lock functions. The keys have a rather loose feel about them, and there is only a slight positive tactile feedback. A red warning light just above the top row signals low power if the attached battery pack needs a boost.

There is no reset button, although the system reboots using the standard IBM three-key restart method.

Storage

The disk drive stores 720 Kbytes (formatted) on double-sided, double-density (80-track) diskettes. Data is transferred at 250 Kbytes/second. The Pro-Lite uses the same (MS-DOS) disk formatting system as the T1100, and files may be shared between both machines.

The manual describes the processor as an 8088 running at 5 MHz. The LCD display is bit-mapped with a dot resolution of 640 by 200. The optional LCD graphics circuitry adds a separate 18 Kbytes of graphics RAM in a decidedly non-IBM fashion. The 2 Kbyte text RAM is also in a non-IBM memory location, although the character graphics correspond to the IBM character set.

Documentation

The supplied documentation was well presented, but written for six-year-olds. It contained very little of interest which could not be gleaned by just examining the unit. There was virtually no information on the software which came with the machine. Perhaps such documentation is available ...

The manual is strong on error handling and recovery procedures, and displays Texas Instruments' normal zeal for customer support issues.

Software

MS-DOS 2.11 is supplied as standard, but with the graphics option for the LCD screen some additional applications become possible. There was no documentation describing MS-DOS — probably just an oversight. In common with the T1100 the Pro-Lite has no battery-backed calendar clock chip. That's a pity, since it's just too easy to ignore the prompts for the date and time and therefore miss out on the benefits of time- and date-stamped files.

The software assortment is quite impressive; apart from the usual offerings (Wordstar, BASIC and Multiplan), there is a Pro-Lite demonstration (occupying no less than four diskettes). This self-booting front end (the 'Shell Access Method') to MS-DOS provides access to eight applications. The menu itself is a well-designed graphic representation of the application characteristics.

The applications consist of:

INDEX	A card-filer index system
APPOINTMENT	A time-management system
SALES PLANNER	Organises prospects and so on
FILE MANAGER	Database system
PRO-LITE	Demonstration software
AUTO-CAD	Graphic design system

as well as a word processor and Framework.

In Summary

I really tried to get excited about this unit. Unfortunately, its weight and the need for an external battery pack did not help. Nor did the final punch line. I had to call TI to find out the recommended retail prices which you can see listed in the product details. Comparisons are odious, but I could not believe that a machine offering less (in its basic configuration) than the T1100 should cost more than twice as much. Nice try, TI. □

Distributor:	Texas Instruments Australia, 6-10 Talavera Road, North Ryde 2113; (02) 887 1122.
Category:	Near-compatible portable computer.
Recommended Price:	$6540 for the computer alone; $290 for the battery pack; $430 for the serial port; $1150 per 256 Kbytes of CMOS RAM.
Worst points:	Pricing, weight.
Best points:	Engineering quality.
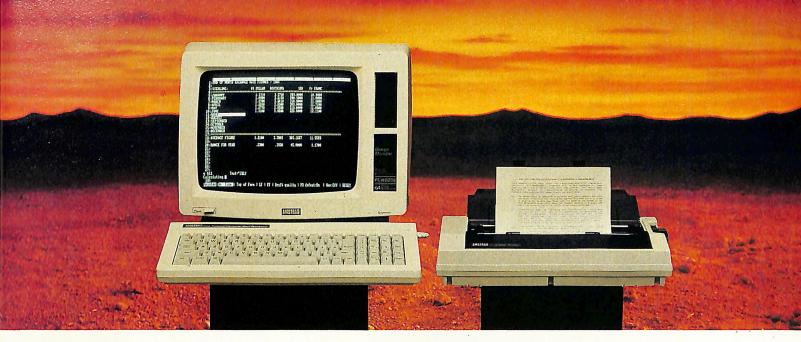
IBM'S SCHOOL TIE

The PC jr, IBM's first attack on the United States' home computer market, was far from an unqualified success. Here Les Bell evaluates the JX — the company's second assault, planned to infiltrate homes through the education system.

THE HOME COMPUTER market can at best be described as fickle, and at worst, non-existent. There really isn't much you can do with a computer in the home; true, there are lots of potential applications, but in practice they are either too much trouble, too inflexible or require specialised interfaces which are not available. Perhaps the major spur to the growth of the home computer market will be the eventual availability of information utilities designed to take advantage of home computers (unlike Viatel, which is designed for modified domestic television sets).

Nevertheless, it was the home market which IBM addressed with the jr. Never released in Australia, this machine clogged the distribution channels immediately after its release, stubbornly refusing to move off retailers' shelves. This could be attributed to several factors: first, the perfectly disastrous rubber-membrane keyboard with 'chiclet' keys; second, extremely limited memory expansion; and third, confused positioning.

IBM's research had shown a surprisingly large number of 'corporate' PCs were being taken home at least once a week. There was therefore an opportunity to sell more hardware: either a portable PC which would be easier to take home, or a second, low-cost PC which could be left at home and perhaps do double duty as a games machine.

Typically, IBM pursued both strategies, perhaps confusing the marketplace. Certainly, many jrs are in use as home compu-

ters, and some — but only a few — are used as home workstations to complement the office machine. The educational market in the United States hasn't leapt to embrace the machine either, despite fixes for all the machine's problems, combined with aggressive pricing.

It is in this climate that Big Blue has released a new home/education computer in Australia, and no doubt the parent company is viewing Australia as a test market for this product.
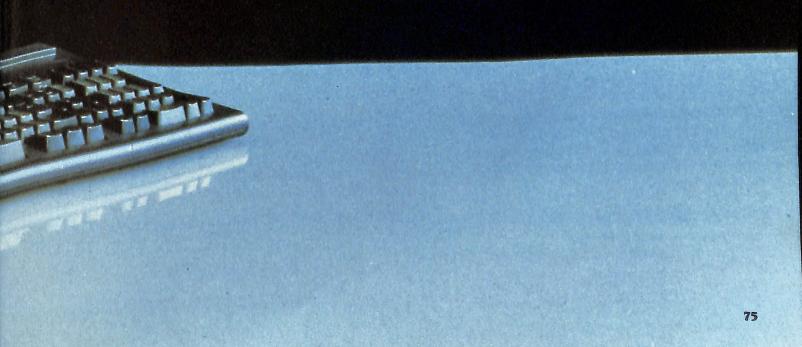
The JX is squarely aimed at the education market, with a spin-off in the home market. IBM is supporting the machine with plenty of educational software, and no doubt games and other software will appear in due course.

First Impressions

The JX is physically quite different from the PC and AT. It is smaller (405 by 290 by 90 mm) and finished in a dark-grey colour. The cabinet consists of a metal tray with plastic facias at front and rear, through which the disk drives, switches and connectors protrude.

The front panel is dominated by the two 9 cm disk drives, and below them the two cartridge slots. To the left of centre in the bottom half of the front panel is the window for the infra-red keyboard link, and at the far left is the on-off switch.

The rear of the machine has numerous connectors for peripherals. From left to right, they are: lightpen, cassette recorder, audio, printer, joysticks 1 and 2, optional ▶

RS232C card, display and keyboard.

Two keyboards are available, with either 79 or 98 keys; the larger one has an additional numeric keypad and duplicate Alt and Fn keys. The keyboard layout is sensible, with a large Return key and Shift keys in the right positions. The function keys labelled PF1 to PF10, rather than F1 to F10, are across the top of the keyboard. Programs like Flight Simulator will need a new function key layout — but then, they'll need to be rewritten for the JX anyway.

The keyboard is much lighter than the PC's, and has a light keyboard action with a conventional feel. What's unconventional about the keyboard is its infra-red link to the system unit; there is no need for a keyboard cable, although one is available as an option. The keyboard only works when it is in line of sight with the system unit; if the unit is some distance back from the edge of a desk, this means you can't use the keyboard on your lap. However, the keyboard will work over a considerable angle and distance; I was able to place the JX on a bench across the office and operate it from the keyboard on my desk. Of course, I have 20/20 vision and knew what was on the screen anyway; others may find the principal 'benefit' of the keyboard is that they can sit sufficiently far away from the JX that they can't read the screen.

The keyboard is battery-operated, but if the batteries run down, the cable will supply power. Likewise, if two keyboards are operated in the same room, at least one must be using the cable, otherwise the infra-red links will interfere with each other.

Display

The display supplied with our evaluation machine was driven by the RGB output of the JX, and provided comparable quality to the Princeton monitor we use on the PC. The colours were reasonably pure, with crisp edges, although the saturation was not as high as on the Princeton. Ironically, the area where the monitor falls down is in sound generation; the speaker is inside the PC, and the volume control on the front of the unit seems to control the timbre more than the volume. The placement of the speaker in the display monitor restricts the kinds of monitors which can be used.

Options

The major option for the JX is the expansion unit which sits on top of it. This carries four general-purpose expansion slots and a 13 cm disk drive, allowing access to jr and PC software on 'conventional' diskettes. The expansion box also has a blank position for another 9 cm floppy disk drive, and there is provision in the software for a hard disk, but no indication of where the hard disk fits. Perhaps a 9 cm hard disk drive is on the cards?

The JX's Logic

The JX is based on the same 8088 microprocessor as the PC, running at the same speed, 4.77 MHz. Memory starts at 64 Kbytes and is expandable to 512 Kbytes, with 64 Kbyte, 128 Kbyte, 256 Kbyte and 384 Kbyte RAM cards (a time-of-day clock is included on the two larger cards). At this stage, it appears unlikely any US-manufactured multi-function cards will be available for the unit, restricting purchasers to the IBM cards. Perhaps there's an opening for a local manufacturer here?

The memory map of the JX follows that of the jr; there is no separate colour graphics adaptor, so 64 Kbytes of system memory are taken up with the video display. However, the video circuitry maps this area to B8000, just like the bigger machines, so software will continue to work.

Similarly, the I/O ports of the machine generally conform to the jr map. However, the JX makes extensive use of custom chips (there are five custom gate arrays), one of which looks after memory and I/O address decoding, and this circuit allows the programmer to change the addresses of the memory banks and I/O ports under software control. Potentially, this makes the JX a completely 'soft' machine; if a piece of software requires the sound generator chip at a different address, the programmer could simply move it there. In practice, this is likely to be less useful.

With 64 Kbytes of memory, the JX is able to display colour graphics at higher resolution than the PC. In particular, at 640 by 200 resolution, the JX can display four colours, while the PC is reduced to monochrome. That's the limit on resolution, however, and I certainly wouldn't advocate the JX as a CAD/CAM machine. The major benefit is for educational software, where diagrams can be detailed yet use colour for emphasis.

Performance

We performed our standard benchmarks on the JX with one major goal in mind: to discover the difference in performance between the older 13 cm disk drives and the new 9 cm type. At the same time, we expected to discover some other small differences from the PC, due to the BASIC interpreter being a bit different, different video memory management and other minor variations.
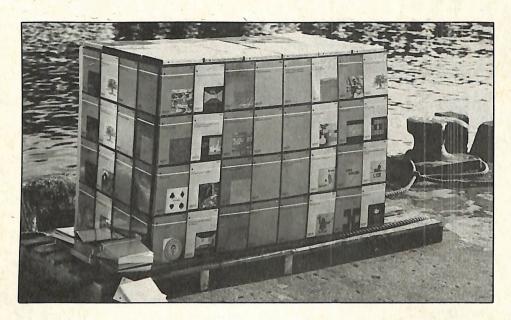
We discovered the 9 cm drives on the JX are slightly faster than the 13 cm drive, though the difference is not large enough to be significant. However, neither is quite as fast as the PC's floppy disk drive — though, again, the disparity is not that large. The figures are summarised in Table 1, together with the standard PC's results for comparison.

Another important benchmark these days is the machine's ability to run software written for the standard IBM PC. We tried a few different packages on the JX, with mixed results. Relatively 'plain vanilla' programs such as Wordstar and dBase II worked with no problems, and we tried the Norton 2.0 utilities and to our surprise they worked just fine.

However, dBase III would not run because of its copy-protection scheme, and we suspect quite a bit of software falls into ▶

Table 1.

Benchmark	Stage 1	Stage 2	Stage 3	Total	Machine/drives
BMARK	246.38	287.17	338.79	875.19	JX / 9 cm
BMARK	246.01	292.28	346.70	884.75	JX / 13 cm
BMARK	206.41	276.26	329.28	811.95	PC / 13 cm
Interface Age Benchmark 9				851.96	JX
Interface Age Benchmark 9				861.57	PC
Sieve of Eratosthenes				1957.39	JX
Sieve of Eratosthenes				1953.53	PC
Disk File Create				27.49	JX / 9 cm
Disk File Create				29.69	JX / 13 cm
Disk File Create				26.99	PC

this category. Flight Simulator didn't run either; it would ask us all the questions at the beginning of the program, but then lock up the system, accessing all the drives at the same time.

A variety of software is becoming available in the 9 cm format; IBM has released a range of its software, such as Personal Writing Assistant and the like. The accent is on educational software: the 9 cm diskette is ideal for use in schools as it is rugged and requires far less special treatment than the larger types.

Advantages

So, what are the advantages of the JX over similar PCs? First, it is compact, requiring less desk space than a conventional PC, and its infra-red keyboard link offers some additional flexibility in desk layout.

Next, its low cost will make it available to market segments previously beyond IBM's reach; in particular, this means the education market, small businesses (perhaps) and whatever sales IBM can get in the home computer market.

Third, the JX offers a couple of advantages for the educational market. First, it is IBM's 'chosen' and supported machine for that market. Next, its rugged 9 cm diskettes are ideal for school use, and the JX will work on the Cluster Program network, which IBM is apparently repositioning for educational use. This makes diskless JXs an attractive option for schools.

Disadvantages

The JX also has a couple of disadvantages. First and foremost is its limited expanda-

bility: there is only one free slot in a 256 Kbyte machine, and that will have to be used for a serial port. Any further expansion will require the expansion box, which optionally adds another two slots.

Related to this complaint is the lack of PC hardware compatibility. All the nice add-ons for the PC, like mice, modems, co-processor boards and others, simply will not work with the JX — they are physically incompatible.

The JX can have at most 512 Kbytes of memory, of which 64 Kbytes is used for video RAM, so it can't support programs and spreadsheets as large as the PC can. And of course, at present there is no hard disk for the JX, although the indications are that that will be remedied.

Finally, because its I/O ports and mem-

ory map are different from that of the PC, and in particular the disk size is different, compatibility with PC software is limited. Of course, programs like Lotus 1-2-3 are available in PC jr cartridge form, which will work on the JX.

Who Should Buy?

There are two major groups for whom the JX would be a good choice: first, home users who have no plans for major expansion or attaching lots of peripherals; second, the education market, which is IBM's main target with the machine, and people in this area will find lots of attractive features.

IBM is also interested in capturing some of the small business market with this machine. A two-drive version would probably be adequate for light word processing use, but for accounting applications — which are of prime importance to small businesses — a hard disk would be essential, so I wouldn't recommend the JX for this purpose until one becomes available.

Computer hobbyists with any hardware interest would probably find the machine frustrating because of the lack of expansion capabilities, and would probably be better advised to plump for a clone if they are on a tight budget. Software enthusiasts might find the machine interesting, although some of the more advanced software tools will not run on it.

In summary, the JX is well conceived and well executed. It owes more to the jr than the PC, so its architecture looks a little strange to us in Australia. Once we develop some expertise with it, there may even be some interesting software and hardware developed locally for it. □

Unit:	IBM Personal Computer JX
Made by:	IBM Corp Japan, with a little help from their friends
Processor:	8088
Clock speed:	4.77 MHz
RAM:	64 Kbytes expandable to 512 Kbytes
ROM:	96 Kbytes
I/O:	Two joysticks, sound, parallel printer
Languages:	BASIC, BASIC, BASIC
Keyboard:	79-key or 97-key QWERTY with i/r link
Display:	Defaults to 40 by 25, also has 80 by 25
Graphics:	640 by 200, four colours
Expansion:	Limited, but it can be done
Best points:	9 cm drives; we now have a standard
Worst points:	Limited expansion
Extras included:	Expansion unit, keyboard cable
Price:	$2115 base (64 Kbytes, no disks), to $3365 for 256 Kbyte two-drive JX3, all including colour monitor
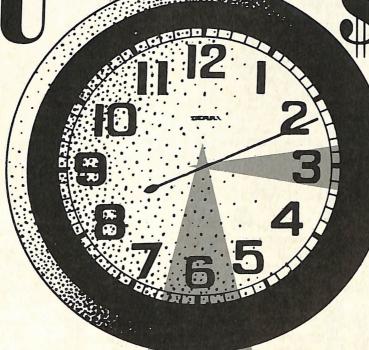
ISN'T IT TIME SOMEONE GAVE YOU $1000

WIN THIS

FOR DOING THIS

WIN:

- A John Sands Sega SC3000H ($349)
- SM1200 Modem ($319)
- Sega Communications Software ($99)
- Game cartridge ($39) and Joystick ($29)
- A computer course
- Five educational programs ($100)
- Three computer books ($50)

A communicating Sega, complete with modem and software — worth $1000!

How? Just by subscribing to Your Computer at the standard subscription price of $27, or renewing your current subscription.

PLUS — We have 100 consolation prizes of *FREE* membership to the Your Computer bulletin board. It's a no-lose and probably-win situation — the odds of you picking up a prize are better than 10-1, and you get a subscription at $8 less than the newstand price anyway!

PLUS — Get a free subscription to *dLetter*, worth $28. Are you a dBase user? If so, you need *dLetter*, the independent national newsletter full of tips, hints and techniques for dBase II and III.

The great new offer from microbee

The Full Story

Microbee, the ideal Education and Home/Business Computer is solving problems every day. Now microbee has solved another problem, the 'COMPUTER-IN-A-BOOK' is now a Computer in a package. Read on and find out how you can have a whole ready to go computer package for one incredible price.

GEOGRABEE
CONTINENTS

RESCUE

THE INTERFACE OF TECHNOLOGY AND EDUCATION

The 3.5 Inch Disk

The COMPUTER-IN-A-BOOK has the perfect low cost, highly reliable, disk drive system that enables expansion to meet your changing needs. It's also available with several options, but most of all, it's an economical way of achieving Disk Drive capability. Featuring, an economical 3.5 inch 400K high speed/high density drive which is very compact and expandable to two drives.

The Offer

This great package offer boasts all of the following equipment:
- 64K microbee.
- 3.5 Inch Disk Drive.
- Monitor in either Amber or Green Screen.
- Full Documentation including a Manual in a binder which details all user requirements and operation.
- In addition to the manual, **an exciting** Demonstration Disk 'Bee Primer' is included.

'Computer-In-A-Book' also features:
- Microworld Basic (Basic Language).
- Word Bee (Word Processing Software).
- CP/M (Operating System).
- Disk Catalogue — Keep a record of all your disks with this easy reference diskette.

The Packaged Software

The 'COMPUTER-IN-A-BOOK' package offer doesn't stop yet. For NO extra cost you have the choice of one of these four great software packages:

The Games Package — Arcade Games Vol. 1 and Family Games Vol. 1 which consists of two disks, valued at $59.00 — Yours FREE!

Arcade Games Volume 1	Family Games
■ Robot Man	■ Australian Economy
■ Scrambler	■ Concentration
■ Viper	■ Chess
■ Eureka	■ Draughts Plus
■ Target	
■ Destroyer	
■ Hustle	

OR

The Primary Education Package which consists of 'Learning Can Bee Fun With Words' and 'Learning Can Bee Fun With Numbers'. Also valued at $59.00 — Yours FREE!

Learning Can Bee Fun With Words	Learning Can Bee Fun With Numbers
■ Rescue	■ Maths Muncher
■ Frog Opposites	■ AC Math
■ Spelling Wars	■ Add Star
■ Alpha Sort	■ Gorilla Maths
■ Land of Lex	■ T.N.T.
■ Spelling Wars 2	■ Fraction Race
■ Alpha Sort 2	■ Maths Race
■ Land of Lex 2	■ Square Targets
	■ Number Mine

OR

The Secondary Education Package which consists of 'Bee Scientist' and 'Social Studies', valued at $59.00 — Yours FREE!

Bee Scientist	Social Studies
■ Intro to Millikans	■ Geograbee
■ Millikans Experiment	■ Histribee
■ Kepper's Law	■ Aussiebee
■ Coulomb's Law	
■ Chemical Compounds	
■ Valency	
■ Elements and Symbols	
■ Vector Tutorial	
■ I J Vectors	

OR

The Home Office Package which contains Business Graphic and Simply DB - Database on 2 Diskettes. Valued at $59.00 — Yours FREE!

ALL THIS FOR JUST $995

Finally, The Software Super Offer — for just an additional $133.00 you can take all four packages, representing a saving of $103.00.

Microbee Modular Technology

Because no two people or situations are quite the same it follows that no one computer will satisfy everyone's needs. Bearing this in mind, the Microbee Modular range was developed, offering upwardly mobile memory packages coupled with bundled operating systems and software, to perform the most useful functions at all of the three optimum levels of memory power. Consequently, the Microbee range boasts three very useful computers.

First in the range is

PC85 — The Personal Communicator
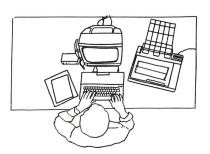
Ideal for school and home, or used in conjunction with the BeeModem, perfect as a low cost communications terminal for business or pleasure. The PC85 has convenient built-in software (firmware), so with a couple of key strokes you can select any of the many programs already on board.
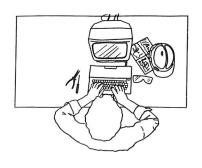
Computer-In-A-Book
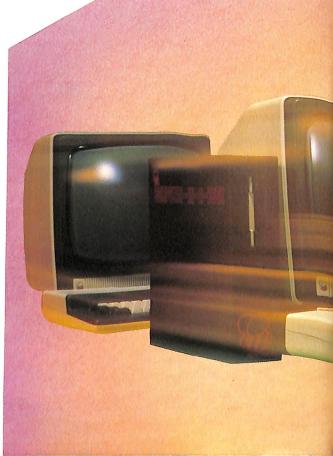
The middle of the range Microbee is the unique Computer-In-A-Book, with its single 3.5 inch Disk Drive and optional second Disk Drive performing all the educational and entertaining functions of the PC85 with added memory and speedy access to more complex programs through its compact high speed, high density Disk Drives.

Now Graphic Word Processing

Building on this strong base, the Computer-In-A-Book offers improved Graphic/Word Processing and more sophisticated management software complete with CP/M, the operating system that puts a whole library of world class software at your fingertips.

Small Business System

Microbee 128K Small Business System completes the family with 128K of dynamic RAM and Dual 5.25 inch Disk Drives to make easy work of most business tasks. Available with 10 Megabyte Hard Disk and supplied in two

Built in Software. Configure and Directory Screen in PC85

configurations, as a general Small Business Computer or as an intelligent Word Processor/Computer the versatile 128K Microbee is an information processor with unlimited applications in a host of commercial and Higher Education situations.

Expandable Systems Under $1000

Microbee offers 'first time' buyers easy low cost entry levels with two complete systems under $1000. Both systems are expandable and upgradeable to meet your growing needs. *You should never fear obsolesence.* Today's Microbee will grow with you providing new challenges, encouragement and solutions to many every day problems in school, home and business situations.

Unequalled in Scope

Microbee's unique modular approach to computer technology has developed an impressive range of educational home and business systems unequalled in their scope for both lateral and vertical expansion. Readily interfacing with an ever growing range of peripherals, the current range of Microbee's with their 32K, 64K and 128K RAM can handle most every situation at prices you can afford and with the software you need.

The Computer You Can Afford

So, if you're shopping for a computer do yourself a favour, check out the Australian made Microbee at your nearest Technology Centre or Dealer. The friendly Microbee team have all the answers and technical support plus some great offers on Microbee — **the computer you can afford.**

Improve your Communications With PC85

The Microbee PC85 really is a great communicator. User friendly, it's packed with innovative features like one touch selection; that enables you to choose from a menu of built-in programs. Word Processing, BASIC, a Calculator, Telecommunications and more. These commonly used programs, plus three bonus business programs, are all inclusive in this offer from Microbee.

Viatel as standard

The exciting news is that Viatel, the Telecom service which enables you to convert your Microbee into a Videotext terminal, will come standard with the PC85. Viatel is an easy-to-use, low cost information system. By connecting to a Bee Modem and accessing Viatel, your Microbee can provide news, weather, telebanking, information, even games. And if you're playing the money game or stockmarket, Microbee with the Viatel option is the perfect technology tool to keep you informed and in front.

Spreadsheet, Database and Graphics

The Personal Communicator offers more with packaged software that includes spreadsheet, database, and simple business graphics.

Apart from the software built-in, you'll be impressed with the increased versatility offered by the PC85. That's why we've called it **The Personal Communicator.**

Look at the simplicity when it comes to selection of programs:— The first letter of the name of the program is all that's required, you type it in and immediately access the appropriate choice on the menu.

New Release

The all important business trio spreadsheet, database and business graphics are now on board in your new Microbee.
Spreadsheet: the electronic ledger for small business and beginners.
Database: an easy to use computer filing system puts all your records (files or address book) in order and keeps them in order while you add more files and retrieve information at will.

4.

Programs supplied with PC85
as standard:—

☐ MicroWorld BASIC

☐ Help ROM for help on
BASIC STATEMENTS

☐ Wordbee — Word Processor

☐ Telcom — Communications
Software

☐ Self Test Program

☐ Calculator

☐ Machine Code Monitor

☐ 24 hour Clock with Alarm

Business Graphics: illustrates
financial reporting, growth, profit and
loss, produce bar charts (Histograms)
and line graphs to illustrate the state
of the budget (or even the growth of
your pet dog). With this easy to use
business graphics package all you do
is enter the figures — the Microbee
does the rest.

NI-CAD Battery Back-up

Microbee's nickel cadmium battery
back-up means you don't lose your
data if the power goes down or when
you switch off your system for the
night.

Computer Literacy In-A-Book
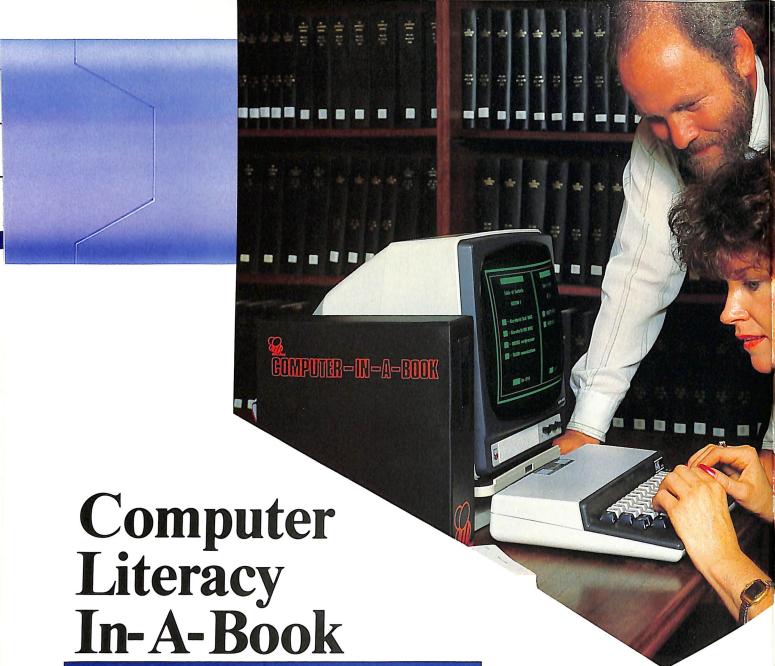
MICROBEE'S 64K COMPUTER IN-A-BOOK

Microbee, the ideal Education and Home/Business Computer is solving problems every day. Now, Microbee has solved another problem, 'COMPUTER-IN-A-BOOK' is now a Computer in a package. Read on and find out how you can have a whole ready to go computer package for one incredible price.

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- Full Documentation including a Manual in a binder which details all user requirements and operation.
- In addition to the manual, a Demonstration Disk 'Bee Primer' is included.

'Computer-In-A-Book' also features:

- BASIC language (Microworld BASIC).
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- CP/M (Operating System).
- Disk Catalogue — Keep a record of all your disks with this easy reference.

The Packaged Software

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Arcade Games Volume 1

- Robot Man
- Scrambler
- Viper
- Eureka
- Target
- Destroyer
- Hustle

Family Games

- Australian Economy
- Concentration
- Chess
- Draughts Plus

OR

The Primary Education package which consists of 'Learning Can Bee Fun With Words' and 'Learning Can Bee Fun With Numbers'. Also valued at $59.00 — Yours FREE!

Learning Can Bee Fun With Words

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- Frog Opposites
- Spelling Wars
- Alpha Sort
- Land of Lex
- Spelling Wars 2
- Alpha Sort 2
- Land of Lex 2

Learning Can Bee Fun With Numbers

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- AC Math
- Add Star
- Gorilla Maths
- T.N.T.
- Fraction Race
- Maths Race
- Square Targets
- Number Mine

OR

The Secondary Education Package which consists of 'Bee Scientist' and 'Social Studies', valued at $59.00 — Yours FREE!

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- Millikans Experiment
- Kepper's Law
- Coulomb's Law
- Chemical Compounds
- Valency
- Elements and Symbols
- Vector Tutorial
- I J Vectors

Social Studies

- Geograbee
- Histribee
- Aussiebee

OR

The Home Office Package which consists of Business Graphic and Simply DB - Database. Valued at $59.00 — Yours FREE!

The Right Options

Microbee Computer-In-A-Book has many exciting options. Extras include Bee Modem. Connect your Bee with the rest of the world with this Telecom approved Modem that will convert your Microbee into a Videotext Terminal. PRICED AT $189.50.

The Viatel Option at $49.50 used in conjunction with the Bee Modem, will bring the world to you. Viatel puts you in touch with what's happening — News, Weather, Stock Market, Tele Banking Information and the new Microbee Viatel service.

The Great Business Offer From Microbee

THE 128K SMALL BUSINESS COMPUTER

Microbee Small Business Computers are already providing invaluable help to thousands of Businesses around Australia, indeed around the World. It would seem that there are few professions or areas of commercial endeavour that cannot be streamlined or made to be more "accountable" with a Microbee Computer.

Butchers, Bakers, etc.

Users range from publishers to pathologists, even car yards are finding the Microbee Small Business System the cost effective technology tool that keeps their records straight, their correspondence in order, and keeps them in touch with the fast moving world of Data Communications and Videotext Services.

The Software You Need

With the Microbee's now famous Bundled Software and CP/M operating system most routine computer functions are catered for without spending another cent, but it is highly likely that it is in the area of specialist applications software that Microbee scores most points. With so many third party software supplies able to provide specific solutions at realistic costs that don't in themselves create problems (check the prices of software to run on so called Compatibles).

User Friendly Interface
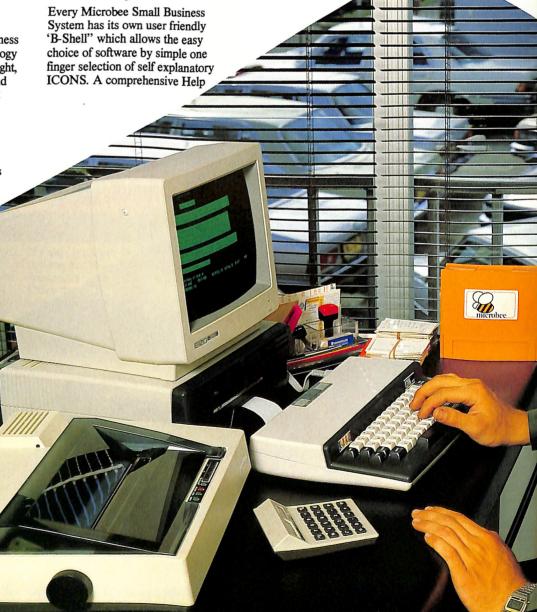
Every Microbee Small Business System has its own user friendly 'B-Shell' which allows the easy choice of software by simple one finger selection of self explanatory ICONS. A comprehensive Help system is supplied and 'housekeeping' functions are simplified.

Australian Guaranteed

Built to exacting control standards and World class quality the Microbee System is particularly robust remember the Microbee was first developed for use in schools, and in fact the same machine is in extensive use in schools, both in Australia and overseas.

The Complete Business Package

The Microbee Small Business Computer comprises:
Microbee 128K Computer
Dual 400K 5.25" Disk Drives
High Resolution Monitor
DP100 Dot Matrix Printer
Cables and full set of manuals
Plus Bundled Software worth hundreds of dollars. (See next page).

BUNDLED SOFTWARE

WordStar/Mailmerge 3.3, Microsoft Basic, Microsoft Multiplan, MicroWorld Basic, Telcom Communications Package, Full range of support utilities, Comprehensive Training Guides and Tutorials, also includes a complete library of manuals so you can easily and quickly gain the maximum benefit from your system.

The Price

For the complete Small Business System only $2395 including Sales Tax.

Even less without a Printer, the Small Business System only $1995 including Sales Tax.

Exciting New Options

As part of Microbee's Product Innovation Program, new releases which will shortly be announced include:

The DP100 NLQ or Near Letter Quality Printer.

The MB 7030 High Resolution (0.38 pitch) RGB Colour Monitor.

The MB 3010 Green Monitor and the ESE Economy RGB Monitor.

THE SPECIAL OFFER
'The Living Letters Package'
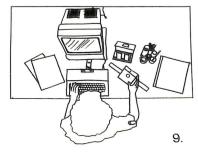
As many of the Microbee Systems out there are used extensively for Word Processing with little need for Microsoft Multiplan, the new 'Living Letters Package' has no Multiplan or Microsoft BASIC. But it does have **The Complete WordStar Package** to bring life to your writing and considerable savings to your pocket.

The Complete WordProcessor ALL FOR JUST *$1995* Inc. Sales Tax

*Special Offer available from 1st December 1985 and includes DP100 Dot Matrix Printer.

9.

Expansion Modules For Your Complete System

All Microbees expand horizontally giving you the freedom to create your own optimum technological environment — your own tailor made work station. On these pages you see the current Microbee range of peripherals — expansion modules to suit just about any situation. Other 'more sophisticated' technology might be offered at a premium elsewhere, but you won't find more cost effective expandable modular systems than the 'Microbee Systems'.

Low Cost Data

Hundreds of good programs are available on low cost cassettes making the Microbee Data Cassette indispensible for PC85 owners.

Explore Speech and Music Synthesis

Hackers and Students might like to experiment with Beetalker and Beethoven to explore speech and music synthesis.

Wired to the World

Bee Modem is the communications peripheral device of today, opening up a world of information through remote DataBase access — and "Wiring your Microbee to the World' through Telecom's exciting Viatel Service which offers tele-banking, tele-broking, news, weather, software and many more two-way communications in the comfort of your own home.

To Put You in the Picture

Microbee puts you in the picture with the best ever range of Microbee Monitors. The reliable low cost Microbee ESE green and amber screen monitors are ideal for most home and small business applications, and will give years of trouble free service.

Clear Text and Stunning Graphics

New releases soon to be available are three new monitors. The Microbee 3010 12" High Resolution professional green screen monitor designed for easy reading and operation, the Microbee 7030 12" High Resolution RGB colour monitor designed for clear text and stunning graphics, and the cost effective Microbee ESE RGB colour monitor (not shown), great for home or office and perfect when used with a colour Microbee as a videotext terminal.

Put Your Thoughts on Paper

Microbee printers put your thoughts on paper with a choice of either the popular DP100 Dot Matrix Parallel Printer (soon to be available in Near Letter Quality) — the only printer to use when mixing text with graphics, or the Proffesional Word Processor's choice — the proven DSY120 Daisy Wheel Printer which uses standard daisy wheels for easy font replacement.

Experimenters Kit

Microbee also supplies a number of fascinating kits for experiments at home or school. The Experimenter Board is just what the name implies. Designed to make hardware experiments on the Microbee a lot easier. You will need to know how to use a soldering iron because the board is supplied in kit form. Facilities incorporated include, buffers for address and data lines, buffers on outgoing control lines, decoding for 16 ports and 2 programmable parallel ports. Full instructions and suggested experiments are supplied.

Program Your Own Chips

The Microbee EPROM Programmer and ROM Board make a great team with a PC85. The EPROM Programmer stores programs in EPROM's (Erasable Programmable Read Only Memory) chips for use on the ROM Board which holds eight 2764 type EPROMS. You can also buy several programs on EPROMS so you can add even more of your favourite programs to your PC85 or earlier 16K and 32K Microbees.

For full details about the latest kits and experiments around, contact your nearest Technology Centre or Dealer.

Keeping You Online

Taking it for granted that once in a while you will want to use the 'old fashioned' data transfer medium (reading), Microbee has published and sells many different books from beginners programs to advanced tutorials, see the price list or call into a Technology Centre for more details. One publication you will find essential reading is Online, the Microbee Owners' Monthly Journal, good reading, full of interesting features and regular columns on your favourite subjects and of course tutorials to help you grow with Australia's own Computer — The Microbee.

Business Education & Entertainment

Software is the fuel that powers your machine, and, as you can see, the Microbee is not about to run out of gas — in fact we've got software solutions for just about any situation — our only problem is listing everything we have. So, if you don't see it here —call us — we'll have it in stock or locate a third party supplier for you.

GAMES
Software currently available on cassette.

Adventure in 3-D, Adventure Pak, Amazon Search, Altantic Sea Battle, Australian Economy, Baby Bouncer, Bee Casino, Capture, Cave Hunt, Chess/Chess tutor, Chopper Pilot, Concentration, Depth Charge, Defender, Destroyer, Dragon Slayer, Draughts, Dungeons of Khan, Escape from Colditz, Eureka!, Frontier Adventure, Genius & Insanity, Golf, Graphic Lander, Gridfire, Island Adventure, Lazer Blazer, Museum Adventure, One Day Cricket, Planet X, Pogog Manor, Castle Eldritch, Ring of Doom, Robotman, Scrambler, Seadog, Space Invaders, Space Lanes, Sword Quest, Sydney Approach, Target/ZTrek, Valley & Caves, Video Maze, Viper, Wonderwords.

GAMES
Software currently available on disk.
ADVENTURES VOL 1.
The Cave, Eye of Min, Sabre of Sultar, Temple of Azragor, The Valley.
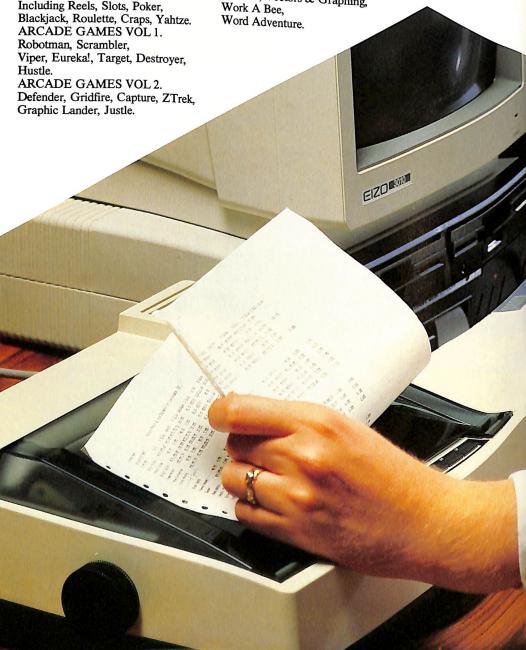
GRAPHIC ADVENTURES VOL 1
Amazon Search, Adventure in 3-D, Castle Eldritch, Dungeons of Kahn, Sword Quest, Seadog.
GOLF
Target Golf, Match Play Golf, Microbee Golf.
FAMILY GAMES VOL 1.
Aust. Economy, Concentration, Chess, Draughts Plus.
SWORD QUEST PLUS
Sword Quest, Space Invaders, The Valley, The Caves.
BEE CASINO
Including Reels, Slots, Poker, Blackjack, Roulette, Craps, Yahtze.
ARCADE GAMES VOL 1.
Robotman, Scrambler, Viper, Eureka!, Target, Destroyer, Hustle.
ARCADE GAMES VOL 2.
Defender, Gridfire, Capture, ZTrek, Graphic Lander, Justle.
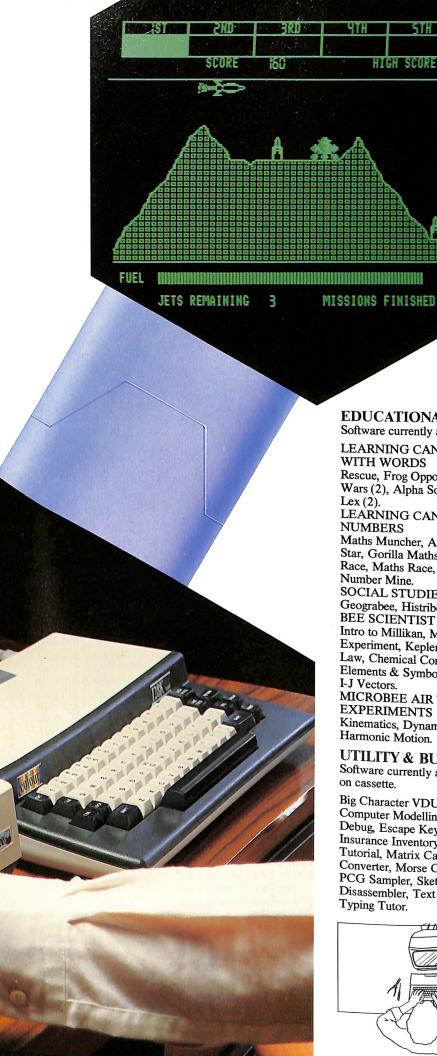
ARCADE GAMES VOL 3.
Space Invaders, Chilly Willy, Chopper Pilot, Baboon, Lazer Blazer, Space Lanes, Depth Charge.
STRATEGIC GAMES
Sydney Approach, Graphic Life, Video Maze, Noughts & Crosses, Survivor, Solitaire, Eliza.

EDUCATIONAL
Software currently available on cassette.

A Reading-ALL, EI Reading OU, Chemical Equations, Complex, Coulombs Law, Electromate, Function Machine, Gen. Inheritance, Geograbee, Geo-Tech Draw 1-2, Geo-Tech Draw 3-4, Interstellar Postman, Intro to Chemistry, Keplers Laws, Learning Can Be Fun (7 volumes), Logo, Marbles & Jailbait, Market Simulation, Maths Adventure, Millikans Experiment, Miner, Morse Code Tutor, Moving with Maths, PCG Sampler, Projectiles, Speed Reading, Spelling Wars 1 & 2, Stats Tutorial, Stat Pack, Teachers Busy Bee, Typing Tutor, Vector Tutorial, Vectors & Graphing, Work A Bee, Word Adventure.

EDUCATIONAL

Software currently available on disk.

LEARNING CAN BE FUN WITH WORDS
Rescue, Frog Opposites, Spelling Wars (2), Alpha Sort (2), Land of Lex (2).

LEARNING CAN BE FUN WITH NUMBERS
Maths Muncher, A.C. Maths, Add Star, Gorilla Maths, T.N.T., Fraction Race, Maths Race, Square Targets, Number Mine.

SOCIAL STUDIES
Geograbee, Histribee, Aussiebee.

BEE SCIENTIST VOL 1.
Intro to Millikan, Millikans Experiment, Keplers Laws, Coulombs Law, Chemical Compound, Valency, Elements & Symbol, Vector Tutorial, I-J Vectors.

MICROBEE AIR TRACK EXPERIMENTS
Kinematics, Dynamics, Collisions, Harmonic Motion.

UTILITY & BUSINESS

Software currently available on cassette.

Big Character VDU, Busy Calc, Computer Modelling, Data Base, Debug, Escape Key, General Ledger, Insurance Inventory, Keyboard Tutorial, Matrix Calculator, Metric Converter, Morse Code Tutor, PCG Sampler, Sketch Pad, Super Disassembler, Text Formatter, Typing Tutor.

BUSINESS/ ADMINISTRATION

Software currently available on disk.

CP/M Software such as Multiplan, WordStar/Mail Merge/SpellStar/Star Index, dBase II. Graphic WordBee, Business Graphics and Simply DB.

NEW RELEASES — DISKETTE

TECHNICAL DRAWING
Cubism, Geo-Tech Drawing 1, Geo-Tech Drawing 2, Geo-Tech Drawing 3, Geo-Tech Drawing 4.

ADVENTURES VOLUME 3
Magic Ring of Targon, Rescue Prince of Targon, Cave Adventure, Mystery of the Pyramid.

SCIENCE TUTORIAL No. 1
Geology, Biology & Chemistry, Plate Tectonics, Carbon Cycle, Genetics, Mendel's Experiment, A Periodic Table.

SCIENCE TUTORIAL No. 2
Physics & Maths, Projectiles, Ballistics, Shellfire, Lenses, Vector Addition, Graph, Function Machine.

HOARDS OF THE DEEP REALM

BUSINESS GRAPHICS

GRAPHIC WORDBEE

TELCOM 2.2

NEW RELEASES — CASSETTE

Magic Ring & Rescue Prince of Targon, Cave Escape & Mystery of the Pyramid, Bridge Builder, Aussiebee, Cannibals & Missionaries, Carbon Cycle, Graphic Life Tool Kit, Histribee, Kinematics, Lenses, Trader, Turtle, Wonderwords, Wodl Graphics.

Join the Microbee Movement

*T*he prices listed below are indicative of the real value you can expect from Microbee. All products listed are available from your nearest Microbee Technology Centre or Dealer. Short delays may be experienced with some lines so phone your order through as soon as possible to facilitate delivery before Christmas.
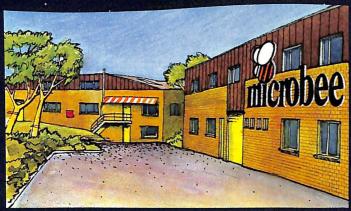
HARDWARE

100.203	128K Dual Drive/Monitor	$1,995.00
100.210	128K Hard Disk System/Monitor	$2,995.00
100.000	128K 'Living Letters' Package	$1,995.00
100.103	32K P.C. '85, Monitor	$ 599.00
100.003	32K P.C. '85	$ 499.00
970.037	50-Way Expansion Kit	$ 65.00
100.006	64K Ciab Vol. 1/Monitor	$ 995.00
100.005	64K Ciab Vol. 2	$ 345.00
970.032	BeeModem 300 Baud, 1200/75 Baud	$ 189.50
970.024	BeeTalker	$ 120.00
970.022	Beethoven	$ 120.00
970.036	Cable Kaga Colour	$ 49.50
990.105	Data Cassette	$ 59.50
970.020	Eprom Programmer	$ 139.00
970.028	Experimenters Board	$ 69.50
990.126	Monitor-Microbee ESE Amber	$ 149.50
990.125	Monitor-Microbee ESE Green	$ 149.50
970.040	Physics Timber Interface Kit	$ 72.20
990.079	Dot Matrix DP100 Printer	$ 399.00
990.090	DSY-120 Daisy Wheel Printer	$ 499.00
970.038	Real Time Clock Kit	$ 44.55
970.017	ROM Expansion Board (64K)	$ 79.50
970.042	Serial ==> Parallel Interface	$ 119.00
990.000	MB7030 RGB Monitor	$ 599.00
970.036	RGB Colour Cable	$ 49.50
990.000	MB3010 Monitor	$ 229.00
990.000	ESE RGB Monitor	$ 499.00
990.000	DP100 NLQ Printer	$ 399.00

UPGRADES

101.901	Colour Upgrade	$ 135.00
101.905	Upgrade to 128K Dual Drive	$1,595.00
101.911	Upgrade to 64K Ciab (Special)	$ 495.00
101.903	Upgrade to PC85	$ 175.00
101.012 /3/4	Viatel Upgrade ROM 3/3.5/5.25	$ 49.50

SOFTWARE ON CASSETTE

210.002	A-Reading-All	$ 12.50
210.004	Adventure in 3-D	$ 12.50
210.005	Adventure Pack 1 (CLP)	$ 29.95
210.012	Amazon Search	$ 12.50
210.045	Atlantic Sea Battle	$ 12.50
210.050	Australian Economy	$ 12.50
210.060	Baby Bouncer	$ 12.50
210.061	Bee Casino (CLP)	$ 39.95
210.063	Bee Piano	$ 12.50
210.064	Bee Scientist 1 (CLP)	$ 49.95
210.066	Bee Scientist 2 (CLP)	$ 29.95
210.073	Big Character V.D.U.	$ 12.50
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THE TOSHIBA P351
— Perfection in a Printer

Intrepid explorer John Hepworth peruses the
Toshiba P351 — a pioneer dot matrix printer
which emulates the Epson command set as well as
the Qume 11 set.

IBM IS NO LONGER a company; it's a country. According to Toshiba, this metamorphosis took place with the release of its new, top-of-the-range P351 printer. The P351 has what Toshiba calls 'national character sets' for the United States, the United Kingdom, France, Germany, Sweden, Norway, Spain and IBM.

The P351 is a near-letter-quality (NLQ) dot matrix printer, which gives excellent-quality output of text and graphics and is compatible with popular programs such as Lotus 1-2-3. Its main feature is dual emulation: the ability to accept command codes for both the Qume Sprint 11 and the Epson MX-80 printers. All printers accept character strings from the computer to set up the font, the line spacing, the pitch and so forth, but as there is no uniformity in the industry, printers from one manufacturer can go berserk when confronted with control codes for a 'foreign' printer.

Toshiba previously emulated the command set of the Qume Sprint 5. The extended command set of the Qume Sprint 11 was added to the P351, which is still compatible with the Qume 5 set.

The success of the IBM PC resulted in an industry printer standard: the Epson command set. A lot of software is supplied pre-configured for Epson commands, so Toshiba has also endowed the P351 with compatibility with the Epson command set. Obviously only one emulation mode can be available at a time; selection of Qume 11 or Epson is made by pressing a switch at the back of the printer.
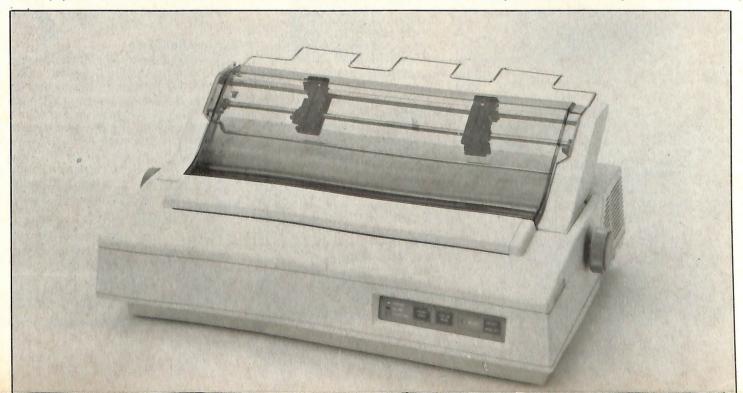
Two Knobs Are Better Than One

The P351 has a stylish beige plastic case, and a hinged cover is provided to give access to the ribbon and head mechanism. A 375 mm (15 inch) platen with dual-platen knobs is standard — a welcome change from many other printers with one knob (always at the wrong end).
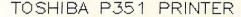
On the front right side of the printer is a panel of select/deselect, linefeed and formfeed switches. The power switch is toward the rear on the right side of the machine and the power inlet socket is adjacent. The serial (RS232) and parallel (Centronics) interfaces (both standard equipment), and the DIP switches used to configure the machine, are inset at the left end of the rear panel. All DIP switches are externally accessible, and can be covered to prevent tampering.
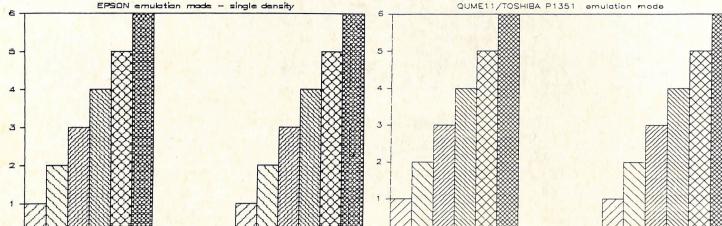
I have one major gripe with the inset panel: the bottom clip which retains the ▶
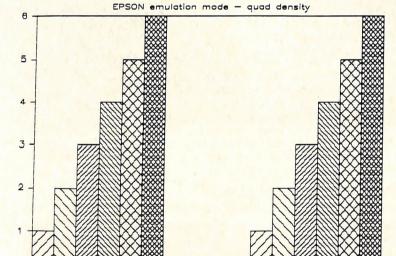
Toshiba printer

TOSHIBA P351 PRINTER
EPSON emulation mode – single density

TOSHIBA P351 PRINTER
QUME11/TOSHIBA P1351 emulation mode

TOSHIBA P351 PRINTER
EPSON emulation mode – quad density

plug in the parallel interface connector is a little close to the side of the inset; I couldn't get two fingers to the clip, and ended up using needle-nosed pliers.

Next to the inset panel are the font cartridge socket and cover. The P351 comes with three fonts in internal ROM, but extra fonts can easily be added by plugging in a cartridge or downloading from disk. However, I didn't have an opportunity to test either the downloadable fonts or font cartridges.

A sticker on the back panel of the machine outlines the purpose of each switch and makes setting up the printer a delight. More evidence of Toshiba's attention to detail is the two-speed fan, which slows down when the printer is idling, to reduce the noise level, and picks up speed to get rid of surplus heat when it's running again.

What's Inside?
Opening the Toshiba's hinged lid reveals a sturdy steel chassis with two polished cylindrical bars carrying the head carriage. A 1 cm wide-toothed belt drives the head carriage along the rails, and the position sensor is on the carriage. The ribbon rides on the head carriage and is easy to load.

The P351 has removable covers for the platen gears. These can be stored in pockets under the front lid, to prevent them getting lost. The printer's gears are generously sized and made of material well-chosen for the purpose: brass for high-torque, low-speed gears and plastic for higher-speed, low-torque gears. Screws and other fasteners are nice and big, and wiring is well terminated and supported.

Size
The P351 takes full-width 375 mm paper. Printers handling this size of paper are usually middling to large in size, but at 560 mm wide, 380 mm deep, 138 mm high and weighing 15 kg, the P351 is relatively compact.
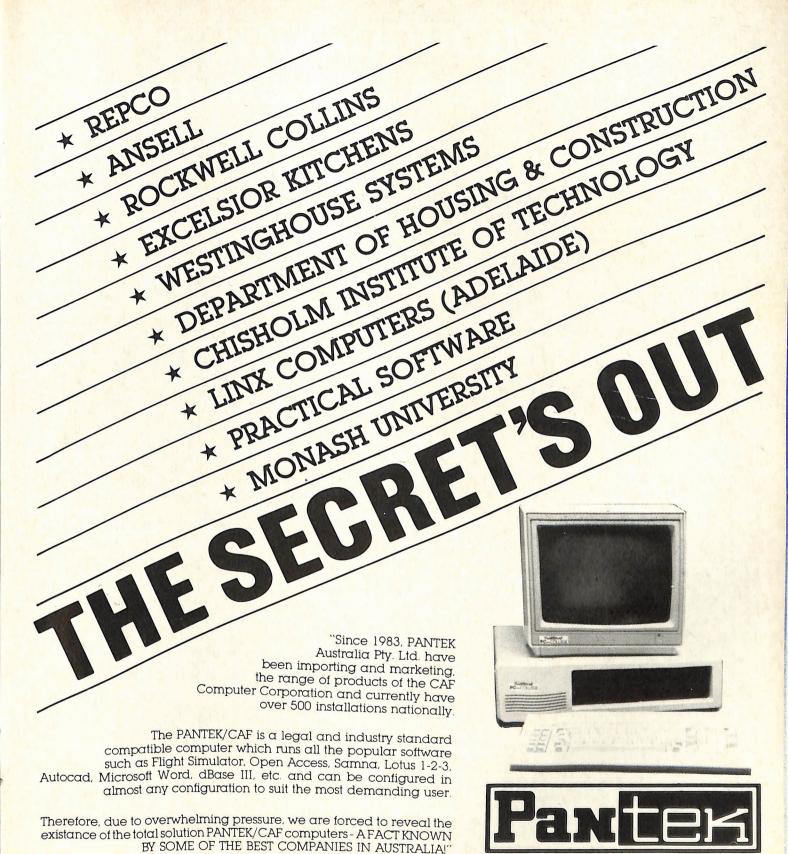
Noise Level
The P351's operating noise level is typical of high-output dot matrix printers: in a shared office an acoustic hood would be essential, while in a private office the noise would be tolerable. The two-speed fan makes far less noise than the IBM PC fan, and is quite bearable — even for long periods.

Paper Handling
Friction feed is standard, with tractor feed and automatic sheet feed optional. Manually placing paper into the single-sheet guide and closing the paper bail automatically advances the paper to the correct starting position. The tractor feed is one of the best I've used; easy to thread (what a change), it has a caterpillar-type feed into and out of the platen. Paper won't skew, tear or misbehave. You can feed to the tractor either through a bottom slot or from the rear.

The sheet feeder was just as good. It clips to the top of the printer with two latches, and a lead from it has to be plugged into a socket on the rear panel next to the serial and parallel ports. Anyone taking more than 30 seconds to attach or remove it is really slow. Again, it fed paper reliably, without a skew or a jam.

Speed

The P351's claimed speed is 288 characters a second in draft mode and 100 characters a second in near-letter-quality mode. At 10 pitch (2.5 mm character spacing or 10 characters an inch), speed in the NLQ mode was exactly the claimed 100 cps. Speed in draft mode depended on pitch and line length; with a line 60 characters long and 10-pitch character spacing speed was about 150 cps. When printing longer lines in condensed mode the speed broke the 200 cps barrier. When printing short lines at high speeds, any printer will lose time reversing the direction of the printhead and feeding paper; the P351 is no exception.

Print Quality

The P351 has three ROM fonts built in. The highest-quality font is as close to daisy-wheel quality as I've seen from a dot matrix printer. The draft mode has fully formed characters, which are more delicate than the NLQ characters, and is good enough for internal reports, while NLQ mode is suitable for high-quality correspondence.

Lotus Graphics

It is possible to print Lotus graphics in both Qume and Epson emulation modes. In Qume emulation, telling Lotus a Toshiba P1351 (the P351's predecessor, and an old friend of Lotus 1-2-3) is attached works perfectly, while in Epson emulation mode selecting FX-80 on the Lotus menu in single, double, triple and quad density gives excellent results. The Toshiba P1351 mode produces delicate lines and perfectly formed characters, while the Epson modes give results which vary from adequate to very good. In both modes vertical and horizontal lines are almost perfect. Diagonal lines are also perfect in Toshiba P1351 mode and slightly wavy in Epson mode. Speed is typical of dot matrix printers producing graphics: acceptable results for A4 plot in a few minutes, with excellent results taking over an hour.

Epson Emulation

IBM made some modifications to the Epson MX-80 and stuck an IBM badge on it, but printers with Epson labels outsold those with IBM labels and as a result a lot of software was written for the generic Epson rather than for the IBM-labelled printer.

The P351 emulates the Epson MX-80 well, with a couple of unfortunate omissions. I found the Epson MX-80 command to set linefeed increment to half normal

doesn't work, nor does the command to reset linefeed to normal. Epson's command which resets the printer to power-on status isn't implemented. Still, most commercial software works well, as do a lot of public domain programs. In the process of testing I found different Epson printers have very different command sets: MX-80s, FX-80s, LQ1500s and the IBM/Epson all show distinct variations in this area. The P351 actually emulates an MX-80 better than any of the other Epson printers.

When tested, the P351 didn't have production ROMs, and those tested were specially burnt so a machine could be available in time for review. Toshiba should look at improving the emulation in the future.

Switching Emulation Modes

No provision is made to switch between emulation modes except via a DIP switch; not exactly recommended for repeated use, but for almost all purposes and users the Qume 11 mode should be perfect, and software needing the Epson command set is rare.

The availability of the IBM extended character set is another matter altogether. Most printers other than the IBM/Epson make no provision for the block graphics characters used on the IBM PC. Users with other computers would choose the national character set for their country, but for IBM users the extended set in the P351 is a godsend.

The Bottom Line

The Toshiba P351 is a well thought out, sturdy, fast printer with excellent character formation. Emulation of the Epson command set in addition to the Qume 11 set, even with the slight flaws in this implementation, is a pioneering exercise. Addition of a front panel switch to toggle between emulation modes will be anxiously awaited, as will the ability to switch between modes by sending strings from software to the printer. In the interim I'll use the Qume 11 emulation mode and choose the IBM character set to match my computer.

The printer is priced at $2195, with the tractor and sheet feeders costing an additional $194 and $1065, respectively (all prices exclude tax). For further information, contact Toshiba Australia, 82-94 Talavera Road, North Ryde 2113. The P351 is one of the nicest microcomputer printers I've seen.

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Features of GrafTalk

Flexible Data Input
GrafTalk will extract data from any text file, including Printer files from most spreadsheet programs. Blank lines and headings are ignored. Unwanted data can be easily masked off. Commas, dollars signs etc do not affect the interpretation of data values.

Mini Spread Sheet
The inbuilt spreadsheet allows the user to view and adjust data, perform arithmetic operations, create new rows and columns, name rows and columns, create sub-sets, and output data to disk or printer. Unassigned values are allowed.

Menu Mode
High-speed screen oriented menus are provided. Write your own menus for your standard operations. Switch between menu mode and command mode at any time.

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Axis Features
Adjust the number and position of axes. Select numeric labels, or text or special labels such as months, days or years. You can use automatic scaling, or nominate the range for each axis.
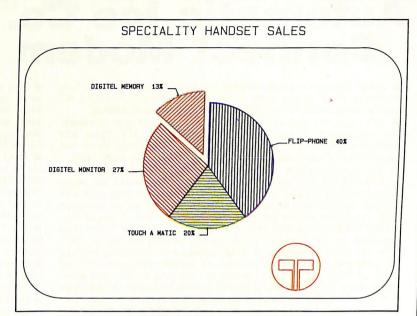
Interactive Graphics
Use the joystick, mouse, or light pen to select a region on the screen, and position legends and text.

Advanced Features
Declare variables, interactive sketch commands, circle and arc, absolute and relative moves, draws and marks, screen or graph coordinate systems.
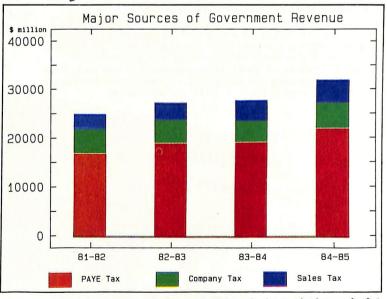
Editor
The powerful screen-oriented text editor within GrafTalk is a very valuable tool for developing graphics. It can be used to create files containing commands, data or both. The editor has commands to allow you to run all or part of a file. If errors are found during execution, GrafTalk returns to the editor, with the cursor pointing to the offending line.

Major Sources of Government Revenue

GrafTalk is distributed in Australia by:

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★ A full monochrome version of Prestel Videotext is implemented in EPROM as well as a limited colour version within the Apple colour display capabilities. A separate Videotext display card with the full colours and features of Prestel as well as an extended high resolution format will be available early 1985. A single keystroke entry immediately turns the Apple into a Prestel Terminal as required by the Telecom Viatel system coming on line in 1985. The modem can operate as a full editing and composing terminal to generate and transmit pictures as an information provider as well as receiving pictures, saving or retrieving to disc and operating under a user-written program, making intelligent decisions on pictures received or sending pictures from memory or disc. Pictures can be dumped to a printer and the **Apple Scribe printer will dump colour pictures.** The firmware transmits the user ID automatically from the battery backed CMOS Ram and the ID can be remotely programmed as required by Viatel. Prestel dialling is also automatically done from phone numbers stored in the CMOS Ram.

★ **A complete comprehensive communications program** contained in EPROM allows easy and immediate transmission and reception of Binary files, Text files and Basic programs to memory or disc — **No other communications software is required.** All modem firmware is bankswitched into the $C200 space and does not interfere with other program memory or disc.

★ Asynchronous or synchronous operation. Supports Bisynch, HDLC, SDLC & X25 at the link level. Flag generation, CRC error code generation & checking are all done by hardware. All registers and operating parameters are fully software programmable.

★ *Auto Answer — Auto dial.* **Senses true dial tone, ring tone, busy tone** and acts intelligently, returning status messages. Automatically selects pulse or DTMF (tone) dialling.

★ Can emulate Hayes Micromodem, Hayes Smartmodem, Apple serial card and Prestel terminal as well as its own modes. Conforms to the published "Firmware" standard for Apple peripheral cards and is compatible with Basic, Pascal, C/PM and machine language programs which obey the Apple standard. A fully transparent mode is available.

★ 2Kx8 battery powered CMOS RAM stores default parameters, phone numbers and log-on strings, allowing **single keystroke call establishment.** The full telephone list can be displayed from a program or the keyboard with logons/passwords selectively not visible. *A further keyboard or program input can establish the link automatically and return a status message.*

★ The Firmware is contained in a 64K EPROM. There is provision for an additional 64K for future expansion or special user-written routines.
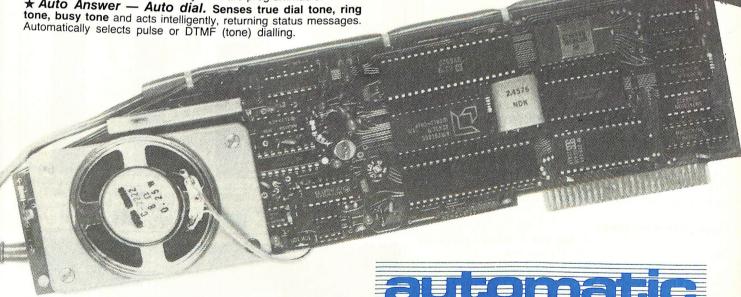
★ **Onboard battery backed calendar clock** can time and initiate calls or keep an activity log. The clock is ProDos compatible and is automatically recognised. It is also accessible for other uses.

·★ Optional standard telephone connection on the modem allows easy installation into existing phone plug. When the modem is not engaged the telephone acts in the normal manner.

★ Has socket for installation of DES data cypher chip for security, identification & EFT applications. *Permission is required from the American State Dept. for purchase of cypher chip.*

★ The modem contains three very sophisticated software programmable integrated circuits connected to all aspects of the hardware and a large amount of unused EPROM space. It is envisaged that additional features will be added to the firmware in future. The documentation is presently limited but the full operation of the hardware and firmware will eventually be documented.

★ **A mini word processor** in EPROM allows pre-composition of memos which can then be sent with a single keystroke entry.

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SAMNA PLUS

Distributor: Arcom Pacific, 252 Abbotsford Road, Mayne 4006; (07) 52 9522.
Hardware required: IBM PC or compatible.
Price: $995 (for the entire integrated package).

I n the June issue I reviewed a word processing program called Samna III. For a comparatively small extra cost you can buy Samna+ instead, which includes two additional functions — a spreadsheet and a wordbase manager.

Since the June review I've had more experience with Samna III, and before I look in depth at the additions Samna+ has to offer, I'd like to explain why I don't feel comfortable using this word processing program.

Some writers describe a program as 'intuitive', by which they presumably mean the program works the way they expected. This sounds like guff to me; surely it depends on background and experience. Take me, for example: I read IBM's Technical Reference manual, which states what keys like Esc, Ins and Del are expected to do. Most programs follow IBM's conventions, such as:

Ins: Start/stop insert text at cursor, shift text right in buffer
Del: Delete character at cursor

I find Samna difficult to use — that is, not 'intuitive' — because it doesn't conform with my idea of how a program should work. With Samna 'insert' is the poor relation of 'overtype' (you can't use many editing keys in insert), and I prefer to work in insert because there is less chance of accidentally deleting text. However, I still like being able to toggle insert on and off. I like Del to delete a single character because I need to do that more often than deleting a lot of text (Samna requires two taps of the Del key to delete a single character).

All this is subjective, of course, but may account for my less than completely enthusiastic response to Samna+.

Spreadsheet

Many integrated packages, notably Lotus's Symphony, use a spreadsheet as a base on which word processing is built. Samna has reversed this and added a spreadsheet to the word processing program.

The Samna spreadsheet has most of the facilities of the spreadsheets in integrated packages, including standard deviation and variance calculations, and horizontal and vertical table lookup. As the manual states, it "can store numbers with a magnitude as big as 1 E308 (this is a number with 308 zeros following it). This is a *very* big number." I can't argue with that!

Because of its word processing connection, the spreadsheet also has features such as the ability to boldface a single cell or a range of cells, or capitalise a cell or range of cells.

Samna is coy about revealing the maximum size of the spreadsheet, but we learned from the list of error messages (Samna enterprisingly calls them help messages) that the limitations include maximums of 64 columns, a width of 250 characters and 6400 cells.

When you enter figures in the spreadsheet they bounce about for a fraction of a second before they come to rest. This quirk doesn't have any adverse effect, and the program seems to work well within its size limitations.

One of Samna's main features is its ability to embed inside a document numbers dependent on cells in the spreadsheet, which change automatically when the figures in the spreadsheet change.

Samna thoughtfully provides a separate keyboard template for the spreadsheet.

Wordbase Manager

You can use this function to index files and locate specified words or phrases, or to locate phrases meeting certain criteria (on an and/or basis). The completeness of the program can be illustrated by the range of options, which include:

- Index files
- Index files at the same time as locating words and phrases
- Locate words and phrases and print the files
- Locate words and phrases and print report of their location
- Locate words and phrases and display their location
- Locate words and phrases and display each occurrence
- Specify words or phrase that must be found together (AND)
- Specify words or phrases when either is found (OR)
- Combine AND and OR to locate combinations of phrases

To clarify the meanings of all these options Samna has provided a table illustrating what Wordbase Manager will and will not find.

The Bottom Line

Samna+ sells for about $200 more than Samna III ($995 vs $786). If I were buying the program I'd think very carefully about whether I would really benefit from the spreadsheet and wordbase manager. (If you want just this combination it's a bargain; you won't find it anywhere else.)

Samna+ may take some getting used to if you've been using other word processing programs and are reluctant to learn something else. But if you don't mind being 'different' my negative comments shouldn't put you off. □

BY JOHN NICHOLLS

SYMPHONY TEXT OUTLINER

Distributor: Imagineering, 77 Dunning Avenue, Rosebery 2018; (02) 662 4499.
Price: $233

Some people may be able to sit down and write a review, an article or an essay without any preparation, but many of us find it's better to jot down a few notes first. Some of the notes may include broad topic headings, while others expand those headings into more detail — this is a text outline. A text outline helps you organise your thoughts and remember points you might otherwise forget, and enables you to write in any sequence you like (if you're using a word processor). I don't always write an outline first (maybe that's obvious from my writing), but I frequently find making some notes helpful. Symphony's Text Outliner makes the process of setting up and using an outline easier.

Here is an example of how an outline might appear:

Introduction

Basics

    Phonetic checking

What you get

    Installation

    Disks

    US and UK versions

        differences between them

Options

    List

    Auxiliary dictionaries

Using Spelling Checker

    Menus

Speed

Conclusion

Price

Value

Notice the main items on the list, chapter headings if you like, are not indented, while sub-headings are indented, and sub-sub-headings are double-indented. With an outline such as this you should be able to jot down ideas as they occur to you, then expand them to full text in any order, rather than the order in which they appear in the final print.

Text Outliner is quite a small program — only 29 Kbytes, with an extra 10 Kbytes of help screens. It's easy to set up the separate Outliner window and enter the various levels for headings, sub-headings and so forth. It's also easy to switch back and forth between Text Outliner and the actual text you're working on. You can move, copy, hide or expose entries, change indents, display level numbers, and change print attributes of headings.

The Text Outliner has several useful features. When you want to change the order in which different headings appear, for example, all you need do is change the order in the outliner and the associated text is moved automatically. Of course, you could do this with the block-move part of a word processing program, but using the text outliner is easier and quicker.

Text Outliner can also generate a table of contents automatically. If you refer again to the example above, you will see it already forms the basis of a table of contents — only the page numbers have to be added. The program provides for several numbering schemes, or for no numbers, to be shown in the Outliner.

So what more could you want? A lower price — $223 is a bit steep! Of course, crossing the Pacific boots the price (by up to 100 per cent with some programs). Text Outliner is easy to learn and use, but it's difficult to see how anybody but writers could benefit from it — this doesn't seem to be the market Symphony is aimed at. □

JOHN NICHOLLS

CLICKART

Distributor: The Computer Factory, 214 Harbord Road, Brookvale 2100; (02) 938 2156.
Price: $60 each

Click go the artistic mice with this range of graphics packages for the Apple Macintosh. The first member of the Clickart family of programs is Clickart Personal Graphics, a collection of contemporary images, such as people, animals, cars and symbols, which can be used from within Macpaint.

The Personal Graphics images are all in Macpaint document format and range from Boy George, Einstein and the Statue of Liberty, to a horse and a farmhouse, as well as a variety of borders which can be sized and placed around anything you like. Personal Graphics pictures can be used when making greeting cards, posters or newsletters, and are ideal for people who want to do quality illustrations with their Mac, but lack the time, patience or artistic ability to do so.
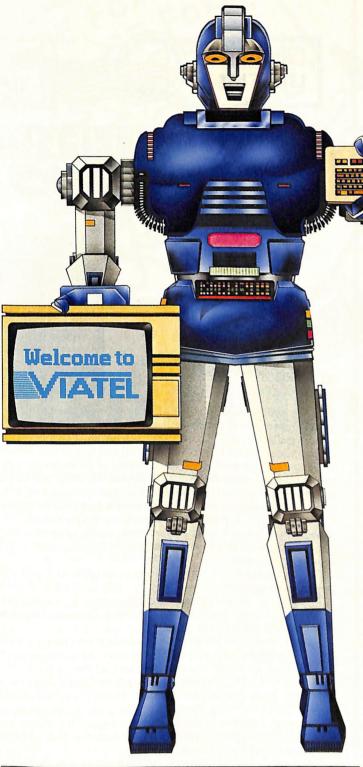
Clickart Publications also features ready-drawn clipart images, but is more oriented toward producing newsletters than Personal Graphics. It provides two layout guides — one formatted for a two-column newsletter, the other for three-column pages — and illustrated headings such as 'Letters to the Editor' and 'Bon Voyage', designed to fit the columnar format. It also includes cartoons, maps of Europe and the United States, and a wide variety of symbols, 'dinkuses' (little symbols), logos and so on.

Using Macpaint together with Publications as a text formatter is not as easy as it might be, since Paint isn't intended to be used as a word processor — so text can't really be edited once typed. There are, however, other programs on the market, such as Page Maker and Macpublisher, designed specifically for columnar newsletters.

Clickart Letters is a lettering system consisting of 15 large fonts and nine Macpaint documents filled with ready-to-use letters. All the fonts have a size range of 24 to 48 points (approximately 8.4 to 16.7 mm high). They are crisp and bold, and come in font-mover form, so they can be loaded straight into any system file. They can easily be used with Macpaint or Microsoft Word, but only some may be used with Macwrite because it can't handle fonts larger than 24 points. If you need larger fonts, those in Macpaint document format are typically 25 mm high (72-point) and include a set of enormous (around 65 mm high) numbers. To use any of the letters in Paint document form, you must employ the lasso tool to drag them into the composition section and form words.

Special Effects

Clickart Effects begins where Macpaint ends, providing four new editing tools with which to work. Your first task is to use the conversion program to incorporate Effects into Macpaint. Effects then appears as the first desk accessory under the Apple menu when you're using Macpaint; it isn't visible from the Finder or Macwrite as a desk accessory. When Clickart Effects is selected ▶

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from the pull-down menu the disk begins to spin, the normal set of tools (eraser, pencil, shapes and so on) disappears, along with the pattern palette at the bottom of the screen, and the four new tool icons appear. When Effects is in use all but two of the menu-bar headings are dimmed, since the contents of these menus are no longer relevant. However, 'Edit' is still bold, so 'Undo' can be used, and the 'Apple' menu is still available, so you can 'unselect' Effects to return to Paint, or select the 'About Clickart Effects' option.

The first of Clickart Effects' new tools is 'Rotate', which simply allows you to rotate a selected part of any image by as little as one degree (Macpaint itself is only capable of rotating images in 90-degree increments).

'Slant' enables you to slant or slope an image or text backwards, forwards, up or down.
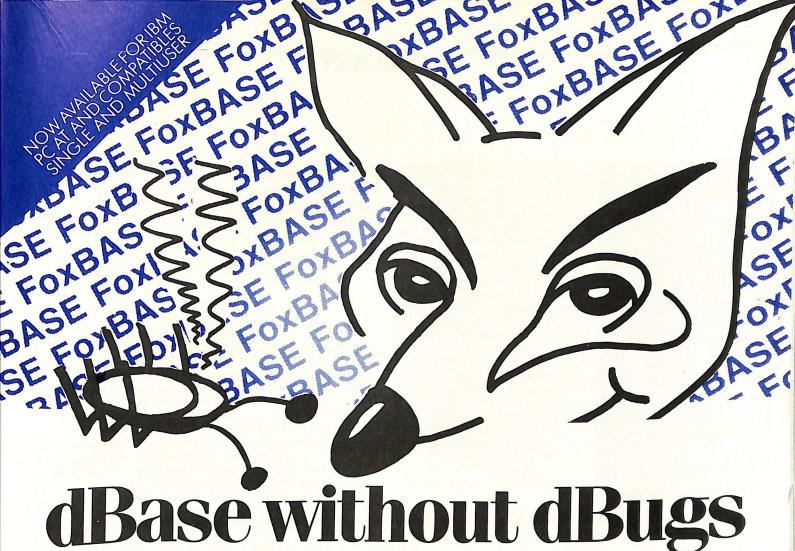
'Perspective' allows an image to have either its foreground or background enlarged or compressed, which can make the picture appear to stretch into the distance.

'Distort' makes an image pliable, allowing it to be stretched in one or more directions. All you have to do is pull on the corners of the selection rectangle you've drawn around the picture.

The Clickart series comprises an excellent set of graphics tools, which will help anybody who wishes to use a Mac for drawing, designing or formatting. Personal Graphics and Publications constitute what I believe is the best set of clipart illustrations ever produced, and Letters is tremendously useful as there has long been a need for large, chunky fonts.

There are no hidden characters in Letters (such as the rabbit in Geneva 12), or many special characters (such as Greek letters), because the fonts already take up a tremendous amount of valuable disk space. My only complaint regarding Effects is once it's selected the grabber tool can no longer be used to move the paper around underneath.

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BY DARREN CHALLIS

DIGICARD HI-CAP DRIVES FOR APPLE IIs

Distributor: Maclagan Wright, Shop 11, Cedar Village, 22 Bridge Street, Eltham 3095; (03) 439 1466.
Price: $1290

The Apple II is a great little computer, with a large and loyal following right around the world. Consequently, there's a stack of programs available for it, developed by both amateur and professional programmers. The bulk of this software mountain is rubbish, but a few real gems shine through in the Apple repertoire.

Unfortunately, Apple has never been able to translate its software base into an attractive package for the business community; the machine simply lacks the storage space to run modern business programs. Apple has tackled the problem in corporate terms by introducing its high-end computers to the market, but only recently got around to releasing a memory expansion card and a 9 cm microfloppy drive for Apple IIs.

Somewhere between then and now a company in Melbourne, Maclagan Wright, slipped in a pair of double-density drives for the Apple II family — the Digicard Hi-Cap system. The unit comes in the standard Apple II yuck-white colour, so it looks as though it belongs.

The drives are positioned vertically in their casing, which is fine once you learn which way the disks go in. After installing the Hi-Cap system I felt much the same as I used to after tinkering with my old Mini — thoroughly negative about the whole business.

First Impressions

The cable's too short, and the plug's too big and won't fit through the hole in the back of the Apple without all sorts of manipulation. The cable also goes to the point on the board where it's guaranteed to cause the most trouble.

All of which goes to show that first impressions can be misleading. In fact, the company has done a great job of expanding the Apple's capacity.
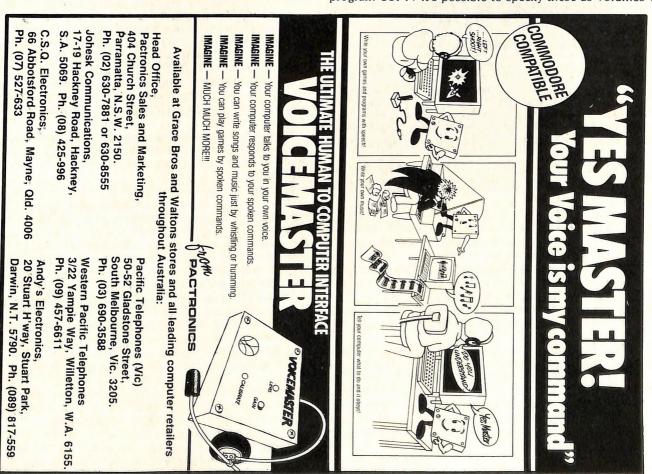
The package is designed around Mitsubishi double-sided drives, and justifiably so. They're incredibly quiet and apparently very reliable. Unlike the terrible noise the Apple II disk drives often make, these give out reassuring thuds from time to time, but otherwise just spin silently. Also in the package is the controller card, which goes into any slot except 3 and 6; a utilities disk; and surprise of surprises, a manual which is simple, short and to the point.
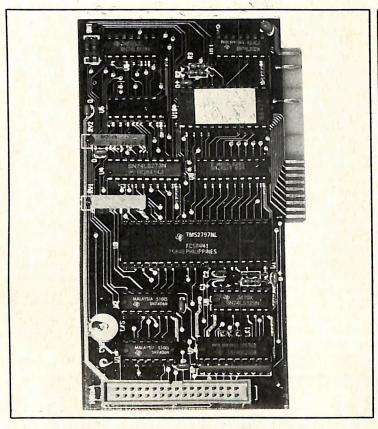
The utilities disk has everything you need to get up and running with the double-density drives, as well as programs to interface with ProDOS, DOS 3.3, Applepascal and CP/M. Unfortunately, I wasn't able to test with anything other than the DOS 3.3 we have installed on our IIe, but from the manual it appears they all accomplish much the same thing. Setting up ProDOS for the high-capacity disks, for instance, seems very straightforward, and apparently all the standard ProDOS utilities will function perfectly with the high-capacity drives.

Using 3.3 is simplicity itself. After the drives have been installed you need to boot a special utilities disk by typing the usual PR#n to activate the nth slot. There's no auto-boot facility because Apple recommends manufacturers shouldn't implement the special identifier bytes used by the standard Apple II drives to initiate an auto-boot.

Booting brings up a menu which allows you to select a number of different utilities, among which a backup copier for the disk and a copy utility to transfer from the standard drives to the high-density disk drives are of special interest. Maclagan Wright recommends double-sided, double-density disks be used. Not having any of these, I used the old single-sided disks I've been using on the Apple for years. No problem.

There's a direct correlation between the Apple II disk drives and the high-density drives when using DOS 3.3. Each high-density disk can store the capacity of five normal disks, and using the copy program COPYV it's possible to specify these as Volumes 1 to 5. ▶

Under DOS 3.3, the high-density disk drives emulate tracks 3 to 34 of a standard Apple II floppy. DOS 3.3 usually occupies the first two tracks on a disk, but on the high-density drives this is unnecessary. As a result, five times 32 tracks (160) of a standard Apple drive can fit happily into the 80 tracks of the high-density drives. In practice it works like a charm; I copied across five old disks full of games with no problems.

You can call any of the disks with a CATALOGUE, V(n) command. Once you've accessed the correct volume it behaves just like an ordinary drive.

Programs Run Well

Using a standard program like Appleworks is terrific. In the normal course of events you have to load two disks to run the program, and probably a third disk as the program disk. With the Hi-Cap system, you only need one disk for the whole program, and the second drive can be used for high-density storage. According to Maclagan Wright, a standard disk drive can only store two full-size (55 Kbyte) Appleworks files, whereas the second disk in a Hi-Cap system will hold 14 full-sized files — 10 such files will fit on the program disk along with Appleworks.

Some simple numbers tell the story. The drives allow 800 Kbytes to be stored on a single disk — except, unfortunately, with DOS 3.3, which only yields 640 Kbytes. Even so, that's an impressive addition to the Apple II's capacity; in fact, in some applications it probably takes the old IIe right into business class. According to Ian Hadley at Maclagan Wright, the main targets are accounting and database-type applications. At an asking price of $1290 plus tax it's got to be a winner. □

BY JON FAIRALL

APPLE TURNOVER

Distributor: Logo Computers, 305 Henry Lawson Business Centre, Drummoyne 2027; (02) 819 6811.
Price: $545

I was recently asked by a software development company to quote a price for converting one of its Apple-based programs for use on the IBM PC. The source code was available (in C), but was in Apple DOS 3.3 format. Since the Mount Crisis Apple IIc is currently out on loan, it seemed the best move was to have these text files converted to PC-DOS format so the job could be tackled on Ron (my PC-XT workalike). Fortunately, there are several firms in Sydney offering this service at a reasonable price.

Transferring files between Apple and IBM PC formats is commonly done by hooking the two machines together with a 'null modem' serial cable, using file-transfer software. This requires a serial card for the Apple and a common protocol for both communications programs, which is a hassle for most users, especially since it isn't the sort of thing you need to do very often.

At $545, the Vertex Apple Turnover is probably not for those who perform occasional Apple/IBM file transfers. On the other hand, it would be very much at home in software houses where products are being developed for a range of hardware hosts; the owner of such a system could also offer a competitive and fast file-conversion service.

The product consists of a short PC card, a cable, and a set of PC-DOS utilities on a 13 cm disk. It's attractively packaged in a well-designed plastic box, which doubles as a binder for the documentation.

The user manual is an example of first-class documentation; each of the eight sections has labelled tabs; the print quality is excellent; the instructions for installing the card and operating the system are crystal clear; and there is a tutorial section illustrating the use of each of the utility programs. Each utility program is accompanied by a configuration file (which may be permanently altered if required) to identify the host parameters. A special appendix provides details for installing the card in a Compaq.

I installed the system in Ron, following the instructions for the XT. The card fits into a spare slot and is wired (logically) between the disk drive controller card and the disks — hence the extra cable. Installation took less than five minutes, and I was pleased to find that the drives still behaved normally afterwards. (I used them to read the supplied utilities to a temporary directory on the hard disk.)

Unfortunately either my YE-Data disk drives were not up to specifications, or Turnover doesn't work on President machines, because I couldn't read a DOS 3.3 disk catalogue.
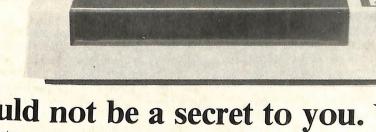
However, the software is obviously well-written, with heaps of explanatory error messages for just such an occasion.

There are, in fact, several caveats about certain types of ▶

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hardware, which are listed in the Appendix. In particular, your disk drives must be 'spot on', since you're asking the IBM's disk drives to routinely read and write two quite different forms of encoding: IBM uses 'MFM' and Apple uses 'GCR' recording methods. The drives must be well within factory specifications for this system to work correctly; the recording heads must be clean, demagnetised and properly aligned, and drive speed should be within one per cent of the specified value and shouldn't exhibit excessive rotational speed variations.

The Appendix notes Teac drives must be modified (by adding a resistor) in order to work correctly with the Turnover, and also lists 'Incompatible Hardware'. Among the machines listed as either requiring special treatment or being completely incompatible are: the IBM AT, Columbia's MPC, the Corona PC, Eagle's Turbo XL, the Zenith 150, IBS machines, NCR's PC, Olivetti's M18 and M24, and the Sperry PC. Also noted as being unsuitable are the Hitachi 505B and Matsushita (Panasonic) disk drives, and the Vista floppy disk controller board. Now I don't feel so bad about Ron's inability to handle the system!

The utilities supplied with the card allow formatting of disks for Apple DOS, and reading and writing of Apple DOS (or CP/M) files. Each utility incorporates a number of switchable options, such as stripping the high bits in textfiles during transfer. Wildcard file specifications are acceptable. Transferred files can be renamed automatically, since Apple DOS filenames can be very 'un-PC-DOS' in nature.

Apple Turnover also has two 'programmers only' utilities, Ap-

plepeel and Unpeel. Applepeel can convert a binary memory image into a binary byte-list file by stripping the file header, and Unpeel works in reverse. The manual includes detailed instructions on how to use these utilities, as well as information on the structure of Apple binary files. Another utility, Atsift, permits minor modifications to textfiles. In particular, it can convert Wordstar document files to standard ASCII text, remove redundant linefeed characters or carriage returns, and perform simple search and replace operations.

All the utilities are menu-driven and well designed, and the error messages (which I managed to generate with ease) are accompanied by a suitable musical apology.

How useful is Apple Turnover? Well, it depends what kind of business you're in. It's important to realise that even though the CPUs in the Apple and PC are totally different, there are many programs which operate with files that can readily be shared. Source code is a case in point, including ASCII BASIC programs. The same is true of many spreadsheet and database systems; for example, spreadsheets prepared with a limited program on the Apple can be further developed on a PC with (say) Lotus 1-2-3.

The Australian distributor of Apple Turnover, Logo Computers, also supports and distributes related products for both the IBM PC and the DEC Rainbow. For further information, contact Peter Klanberck at Logo Computers, on (02) 819-6811. □

BY FRANK LEE

Instruction Set

By The C-side . . .

HOW TO WRITE A STRUCTURED PROGRAM — Part 8

Phil Grouse, author of textbooks on computer programming (and a member of our Computer of the Year Award Committee) continues his series on Structured Programming.

LAST MONTH we completed the design of a somewhat messy name-and-address recording system using structured programming techniques. The design was implemented using the Speedit program editor, which also allowed us to translate the collection of flowblocks directly into BASIC source code.

This month we'll spend a little time revising, then introduce another problem for solving: a sequential file update.

The burden of previous articles was the application of graphic design methods for the specification of structured program logic. In particular, we used the commercial Speedit system to develop and edit graphic specifications (or 'linear flowcharts') and to do the final translations.

Microshare Systems has now upgraded the editor so it can be used for PL/I programs as well as BASIC. The PL/I translator is currently in 'beta testing' stages. It can also be used to create structured English specifications for documentation purposes (a translator is hardly a proposition at this stage).

Rather than tie ourselves to a specific language this time around, we'll adopt the structured English approach to make it easier for us to understand the program's logic. Conversion to a specific language is a simple step which we can tackle later.

A Quick Summary
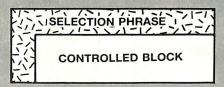
Each program which we develop (using flowblock terminology) consists of a set of flowblocks, the first of which is always the 'mainline'. The remaining flowblocks (or modules) are the subroutines or procedures which are called by the mainline, or by other modules in the program.

Each flowblock in turn consists of a sequence of one or more blocks, each block representing something to be done before passing on to the next, or (if the last
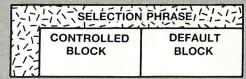
Figure 1. The basic flowblock shapes.
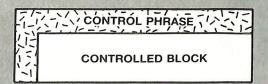
a. Simple sequence operation block.

SELECTION PHRASE / CONTROLLED BLOCK

b. A selection operation in which no (default) action is to be taken if the selection phrase cannot be satisfied.

SELECTION PHRASE / CONTROLLED BLOCK / DEFAULT BLOCK

c. A selection operation with an explicit default operation. The block on the right is performed only if the selection phrase is unsatisfied, otherwise the block on the left is selected.

CONTROL PHRASE / CONTROLLED BLOCK

d. A repetitive block. The inner controlled block is executed according to the control phrase above it. This is usually a WHILE or UNTIL, although others (such as FOR) may also be used.

block) to return to the calling module. Each block has one entry point (conceptually at the top) and one exit point (via the bottom). A logical sequence of blocks of the same width is called a pile. Accordingly, each flowblock is itself a pile.

Within each block one may find other blocks or piles as part of the allowed control constructs. These control constructs have been conveniently grouped into three categories: sequential operations, selection operations and repeating operations. Each category has a unique graphic representation, which is shown in Figure 1.

Allowable selection or control phrases begin with a keyword (such as IF, CASE, WHILE or UNTIL), followed by a related expression. The problem about to be introduced will illustrate a number of these constructs.

Where the description 'controlled block' or 'default block' appears in Figure 1, you can substitute any legal pile made up of a stack of legal blocks drawn from the set shown. This gives us a recursive binary tree structure for program representation.

A Sequential File Updating Algorithm

It doesn't take long for the average (or not-so-average) programmer to bump into a sequential file. These are the most rudimentary file structures and are in universal use, in spite of the development of database systems.

A sequential file is characterised by its access method. It's best to think of a sequential file as a tape of records, recorded one after another. To get to any one record you need to run the tape until the start of the required record is positioned at the read/write head. Sequential files are therefore not very efficient if you want fast access to any record in the file. They are

Names and addresses are notorious for being misspelled, and variations in the arrangement may seem legal to a human reader, but can completely throw a simple-minded program.

▪

most efficient when used with systems in which the next record in the file is the one wanted.

An example might be a file of names and addresses such as the one created by our last programming example. That file was created sequentially and would be read sequentially in order to generate the corresponding name and address labels. Problems arise when you need to make a few changes to such a file.

Changes to sequential files can be of three types only: additions, alterations and deletions. Indeed, the process of record alteration can be replaced by a deletion followed by an addition. Our particular algorithm will be designed to handle all three types of changes.

In the name and address program we made no provision for identifying individual records with some sort of unique code (or key), as there seemed no point in such a complication at the time. Consequently, if we then decide to write a file update program for that application we'll have problems of record identification. Names and addresses are notorious for

being misspelled, and variations in the arrangement may seem legal to a human reader, but can completely throw a simple-minded program.

This highlights the need to fully understand an application before launching into a file design.

Let's suppose we do have a well-behaved master file of records to begin with. All the records have the same length, and each contains a unique 'key field' to identify the record. Examples might be part numbers, membership numbers or social security numbers. We also assume the records have been arranged on the file in an ascending alphabetic sequence. For example, a record with the key 'STNG21' would come after one with the key 'RHGH11'. In other words, they're arranged in dictionary order.

As a further requirement, there are no duplicates in the master file. That is, no two records share the same identifying key.

This latter requirement will make the development of the algorithm somewhat easier. Many sequential master files do contain repeated keys, and this presents no real problem in practice.

The aim of this exercise is to develop the logic for a program which creates a new master file by reading the old master and another sequential file containing the required changes. This latter file is sometimes called a 'detail' or 'variations' file.

Life is made a lot easier by requiring the detail file to contain keyed records, also in ascending order, without repeated keys. In addition, each detail record must carry an additional field to indicate whether it is requesting an addition, change or deletion. We call this new field the detail record 'type'. In our program this will be a single letter 'A', 'C' or 'D', corresponding to the types Addition, Change and Deletion.

For the purposes of the exercise we'll assume the strict sequence requirements of the two input files are observed. It would certainly be possible to provide the additional logic necessary for verifying this requirement, and this would be done in a real-life situation. Alternatively, you could provide a 'front-end' program to do the verification before running the update.

As you'll see, the output 'new master' file will automatically fulfil these sequence requirements as a result of the program logic.

Because of its simple utility, this problem has been tackled countless times, and there are probably as many approaches to its solution as there are programmers. ▶

Figure 2. *Update algorithm state table.*

Algorithm State	Input File States	
	Old Master	Detail
1	Empty	Empty
2	Empty	Full
3	Empty	Finished
4	Full	Empty
5	Full	Full
6	Full	Finished
7	Finished	Empty
8	Finished	Full
9	Finished	Finished

However, the solution offered here is quite different from the usual approach; it's a method I developed about 10 years ago for personal use.

State-switching

Briefly, we'll use a technique familiar to workers in the field of artificial intelligence (AI) known as 'state-switched algorithms'. Despite its forbidding name, the method has considerable advantages,

The secret of state-switching is the ability to identify a reasonable number of discrete states which occur during the process to be programmed. Our problem is to design a set of 'state handlers' which perform the required state action, then adjust the state for the next operation.

But first, the states. This program deals with two input files: the old master and a detail file. Each of these files (or more properly, their input buffers) may exist in one of three distinct states: the buffer is either empty (waiting for a read action), or full (awaiting processing), or empty because the file has reached its end. We'll call these file states 'Empty', 'Full' and

```
UPDATE Mainline

┌────────────────────────────────┐
│ Open both input files          │
│ Open the output file           │
├────────────────────────────────┤
│ State = 1                      │
│ WHILE State is not 9           │
│  ┌───────────────────────────┐ │
│  │ CASE State OF 8           │ │
│  │ ┌───────────────────────┐ │ │
│  │ │ Update*               │ │ │
│  │ └───────────────────────┘ │ │
│  └───────────────────────────┘ │
├────────────────────────────────┤
│ Close all files                │
└────────────────────────────────┘
```

Figure 3. *Mainline program for the sequential update.*

'Finished'. Because there are two input files, the computer executing the file update has a total of nine identifiable states, which we can number (arbitrarily) 1 to 9, as shown in Figure 2.

Figure 3 depicts the program mainline; before you fly off the handle, take time to think it through. I'll try to explain it before

moving on to the secondary modules.

In simple English, this flowblock represents a loop which executes one of the special-purpose modules until the final state (9) is attained. By initialising the state to 1, you force execution of the module UPDATE1, which will need to read one of the two input files. Having done so, the associated input buffer will be affected, so UPDATE1 will need to change the state to reflect the new conditions. That will cause execution of the next appropriate state handler, and so on. The real design problem is now broken into eight sub-problems, each of them relatively simple.

This state-switching approach is applicable to many similar file handling problems. In a situation involving 'n' input files, the total number of states to be handled will be '3n'. As I'll demonstrate in my next article, many of these states share similarities which may be exploited in common logic, thereby reducing the actual number of state handling modules.

While waiting for the next instalment, see how much of this exercise you can solve before all is revealed. □

PCs IN MARKETING
- Part 4

This month, Les looks at how to set up simple budgets on a spreadsheet, laying the groundwork for further analysis and the modelling of market trends.

```
Acme Widget Comp

Month                  1          2          3          4          5          6          7          8
Standard Widget
Volume              9500       9595     9690.95   9787.85959885.7380959984.59547610084.4414310185.28585
Price         $    12.30 $    12.30 $    12.30 $    12.30 $    12.30 $   12.30 $    12.30 $   12.30
Revenue       $116850.00 $118018.50 $119198.69 $120390.67 $121594.58 $122810.52 $124038.63 $125279.02

Fixed Costs   $ 40000.00 $ 40000.00 $ 40000.00 $ 40000.00 $ 40000.00 $ 40000.00 $ 40000.00 $ 40000.00
Variable / Unit $   4.50 $    4.50 $     4.50 $     4.50 $     4.50 $    4.50 $     4.50 $     4.50
COGS          $ 82750.00 $ 83177.50 $ 83609.28 $ 84045.37 $ 84485.82 $ 84930.68 $ 85379.99 $ 85833.79
Gross Profit  $ 34100.00 $ 34841.00 $ 35589.41 $ 36345.30 $ 37108.76 $ 37879.84 $ 38658.64 $ 39445.23
```

	A	B	C	D	E	F	G
1	Acme Widget Comp						
2							
3	Month	1	B3+1= 2	C3+1= 3	D3+1= 4	E3+1= 5	F3+1= 6
4	Standard Widget						
5	Volume	9500	B5*1.01= 9595	C5*1.01= 9690.95	D5*1.01= 9787.8595	E5*1.01= 9885.738095	F5*1.01= 9984.595476
6	Price	$ 12.30	B6= $ 12.30	C6= $ 12.30	D6= $ 12.30	E6= $ 12.30	F6= $ 12.30
7	Revenue	B5*B6= $116850.00	C5*C6= $118018.50	D5*D6= $119198.69	E5*E6= $120390.67	F5*F6= $121594.58	G5*G6= $122810.52
8							
9	Fixed Costs	$ 40000.00	B9= $ 40000.00	C9= $ 40000.00	D9= $ 40000.00	E9= $ 40000.00	F9= $ 40000.00
10	Variable / Unit	$ 4.50	B10= $ 4.50	C10= $ 4.50	D10= $ 4.50	E10= $ 4.50	F10= $ 4.50
11	COGS	B9+B10*B5= $ 82750.00	C9+C10*C5= $ 83177.50	D9+D10*D5= $ 83609.28	E9+E10*E5= $ 84485.82	F9+F10*F5= $ 84485.82	G9+G10*G5= $ 84930.68
12	Gross Profit	B7-B11= $ 34100.00	C7-C11= $ 34841.00	D7-D11= $ 35589.41	E7-E11= $ 36345.30	F7-F11= $ 37108.76	G7-G11= $ 37879.84

THE SIMPLEST spreadsheet model is a budget, similar to the BASIC program shown in the last article. While the BASIC program occupies several pages and is moderately complex, the spreadsheet is straightforward and corresponds closely to the situation being modelled.

For this exercise, I'll use the Lisacalc spreadsheet, since it best displays the formulae which underlie the spreadsheet design, but virtually any other spreadsheet from Visicalc to Symphony or Framework could be used for this example. Most financial analysts would probably use Lotus 1-2-3.

We start in cell A1, in the top left-hand corner of the page, inserting the heading: 'Acme Widget Company Annual Budget'. Then, moving down the left-hand side of the page, we insert the various row labels for the calculations: Month, Standard Widget, Volume, Price, Revenue, leave a gap, Fixed Costs, Variable/Unit, Cost of Goods Sold, Gross Profit.

The idea (obviously) is to multiply the volume by the unit price to give the revenue, then add fixed costs to the total variable costs to give the COGS, and subtract that from the revenue to give the gross profit. The next task is to insert

month numbers, then some actual figures, so moving up to the Month label, we insert the value 1. We could now continue across this row, inserting an ascending sequence of numbers, but spreadsheets offer a much easier way of doing the job.

The cell C3 should contain the next month number after 1, which is 1 + 1 or 2. Rather than enter 2, we can type in the formula for the number, which is the previous month number plus 1, or B3+1. Now, we can copy or replicate that formula into the rest of the cells across that row, right through to M3. On the Lisa you move the mouse and point it in a 'cut and paste' operation to do this. On other spreadsheets it may involve moving the cursor around to indicate where you want the formula copied, or it may involve giving the co-ordinates of the end cells of the range.

Now the months are numbered, we can go ahead and enter some values. Assume current sales of the Standard Widget are running at 9500 units per month and the price is $12.30. These figures go into cells B5 and B6 respectively. Now the revenue is easily calculated: in cell B7 we insert the formula B5*B6, which displays the result, 116,850. Then we turn our attention to the manufacturing costs of the product.

Fixed costs are running at $40,000 per

```
              9         10        11        12Totals

   10287.138710390.0100910493.9101910598.84929120483.77863
$      12.30 $    12.30 $    12.30 $    12.30
$126531.81 $127797.12 $129075.10 $130365.85 $1481950.48

$ 40000.00 $ 40000.00 $ 40000.00 $ 40000.00 $ 480000.00
$      4.50 $    4.50 $     4.50 $     4.50
$ 86292.12 $ 86755.05 $ 87222.60 $ 87694.82 $1022177.00
$ 40239.68 $ 41042.08 $ 41852.50 $ 42671.02 $ 459773.47
```

H	I	J	K	L	M	N
G3+1=	H3+1=	I3+1=	J3+1=	K3+1=	L3+1=	Totals
7	8	9	10	11	12	
G5*1.01=	H5*1.01=	I5*1.01=	J5*1.01=	K5*1.01=	L5*1.01=	sum(B5:M5)=
10084.44143	10185.28585	10287.1387	10390.01009	10493.91019	10598.84929	120483.77863
G6=	H6=	I6=	J6=	K6=	L6=	
$ 12.30	$ 12.30	$ 12.30	$ 12.30	$ 12.30	$ 12.30	
H5*H6=	I5*I6=	J5*J6=	K5*K6=	L5*L6=	M5*M6=	sum(B7:M7)=
$124038.63	$125279.02	$126531.81	$127797.12	$129075.10	$130365.85	$1481950.48
G9=	H9=	I9=	J9=	K9=	L9=	sum(B9:M9)=
$ 40000.00	$ 40000.00	$ 40000.00	$ 40000.00	$ 40000.00	$ 40000.00	$ 480000.00
G10=	H10=	I10=	J10=	K10=	L10=	
$ 4.50	$ 4.50	$ 4.50	$ 4.50	$ 4.50	$ 4.50	
H9+H10*H5=	I9+I10*I5=	J9+J10*J5=	K9+K10*K5=	L9+L10*L5=	M9+M10*M5=	sum(B11:M11)=
$ 85379.99	$ 85833.79	$ 86292.12	$ 86755.05	$ 87222.60	$ 87694.82	$1022177.00
H7-H11=	I7-I11=	J7-J11=	K7-K11=	L7-L11=	M7-M11=	sum(B12:M12)=
$ 38658.64	$ 39445.23	$ 40239.68	$ 41042.08	$ 41852.50	$ 42671.02	$ 459773.47

For this exercise Les moused around with a spreadsheet on the Apple Lisa, but virtually any other spreadsheet from Visicalc to Symphony or Framework would be suitable for the job.

month, while the variable cost component is $4.50. We insert these figures in cells B9 and B10 respectively. The total cost of goods sold is given by the formula COGS = fixed + variable * volume, which in spreadsheet terms is B9 + B10 * B5. Finally, for this month's figures, we calculate the gross profit, which is B7 — B11.

We are now ready to produce the figures for the whole year. The simplest assumption is the volume will grow at a constant rate — say one per cent each month, while pricing and costs will remain constant. This means each month's volume is 1.01 times the previous month's. We insert this, in formula form, in cell C5: B5*1.01. Now we replicate this formula across the spreadsheet to cell M5.

Each month's price is the same as the month before, so we copy this fact into C6; its formula is B6. Then we replicate the formula across the spreadsheet. Similarly, we copy the formula for revenue across the sheet, then do the same for the remaining values and formulae.

You might ask why we express the price as a formula; why not just copy the value across the sheet? The answer is if we change any month's price value, only that month is affected. If it's expressed as a formula, however, the price change 'ripples through' to the following cells, thus becoming a price change from that date on.

We can now go on to enhance the spreadsheet by adding some other features. For example, it would be useful to know the overall situation for the year, particularly the totals. Moving to cell N5, we can calculate the total units sold with the formula SUM(B5:M5). Similarly, total revenue can be calculated in N7 as SUM(B7:M7), and so on.

The basic spreadsheet is now designed, but the appearance can be tidied up by varying the widths of certain columns, such as the titles, and formatting rows containing money amounts to display dollars and cents.

This spreadsheet will serve as the basis for further development, although as it stands it has many limitations. The insertion of fixed and variable costs is too simplistic, but since that's not usually the marketing department's problem we won't deal with it here. On the other hand, the assumption that sales will grow at one per cent each month over a one-year period is a drastic over-simplification of the marketing situation, and that's what we'll concentrate on next.

In next month's article, I'll examine a number of techniques for analysing and modelling market trends. □

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C FOR SMARTIES
PART 2

Now you've got your C-legs, Les is going to raise the C-level a bit and embark on some real programs — C how they run.

HAVING INTRODUCED many of the underlying concepts of the language, we're now ready to progress to writing some simple programs.

Never one to break tradition, I'm going to introduce C via the same program just about everybody uses for virtually every language: the 'Hello World' program. It's the same for all C compilers, and looks like Listing 1. Take a look at it now, and we'll identify all the key elements of the program. It might not look like much, but it displays many of the key characteristics of C programs.

The first line is a comment. All comments are delimited by the comment start (/*) and comment end (*/) symbols. Comments are essential to all but the simplest C programs, and they don't cause any overhead in the generated program. In fact, just about the first thing the C compiler does is to strip all the comments out of the program, since they don't make sense to it anyway.

At the very least, your programs should have a comment at the top identifying the program, its version number, author and latest revision date. Other explanatory comments should be embedded throughout the program as required.

A note about certain compilers. The BDS C compiler, for one, allows you to nest comments within each other. This enables you to 'comment out' lines of code which already have comments within them. However, most other C compilers, particularly the Unix compiler, don't allow comments to nest, and when they come to the first comment end symbol, will start compiling code again. While some compilers have a switch allowing them to compile programs with nested comments, the practice should be avoided. Pity ...

The next line of the program is the name of the function which constitutes the program itself. All C programs are made up of functions which are broadly analogous to BASIC subroutines or dBase command files. You can generally give a function any

name you choose, but one function must be the mainline of code — the actual program — and this is identified to the compiler by giving it the name 'main'.

The brackets immediately after the name tell us it's a function. If the function were being passed any parameters, the formal parameters would be inside the brackets. Having named the function we can now define it by specifying the statements which make up its body. The next line is an opening curly brace ({), which tells us what follows is a block of code making up the function body.

There's only one statement in this function/program, and that's the line:

printf('Hello Worldn');

This is in fact a call to another function called printf, which is an abbreviation for formatted print. In other words, this statement is equivalent to BASIC's PRINT or dBase's ?.

We pass it an argument, which is what we want it to print. In this case it's very simple — just a string of characters. In C, string constants like this one are always enclosed in double quotes (" "). The last character in this string is a 'newline' character, which will cause the cursor on the terminal to move onto the next line after printing 'Hello World'.

The backslash ( ) has special meaning to the C compiler — it's what we call an escape character, and its function is to change the meaning of the following character. There is a number of such special escape character pairs — the most important are shown in Table 1.

The last line of the program is a closing curly brace (}), which indicates we've come to the end of the function body.

That's a brief tour round our first C program. The next thing to do is to compile it and run it, to check it does what we expect it to do. You can create the program source

We pass it an argument, which is what we want it to print. In this case it's very simple — just a string of characters. In C, string constants like this one are always enclosed in double quotes (" "). The last character in this string is a 'newline' character, which will cause the cursor on the terminal to move onto the next line after printing 'Hello World'.

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code file with virtually any editor: Wordstar in non-document mode, Wordmaster, Pmate, Vedit, Edix — you name it. Create a file called hello.c and type the program in, then save it.

The commands required to compile the program and link it with the C function library depend upon your compiler. The examples listed in Figures 1 and 2 show the commands for some popular compilers.

(Of course, you never type in all those lines. Instead, create a submit file or batch file which will execute the various passes of the compiler and linker automatically.)

Once the compiler and linker have run, the result should be an executable prog-

ram file. For DOS, it will be hello.exe, for CP/M-86, hello.cmd, and for CP/M-80, hello.com. To run it, just log into the appropriate drive and type 'hello<RET>', and you should get the message:

C:cic>hello   Hello World
C:cic>—

If you're running a C interpreter such as the 'Introducing C' interpreter from Computer Innovations, the technique is somewhat different. In the case of 'Introducing C', for example, you use the interpreter's built-in editor to type in the program, then press the F2 key on the PC keyboard; this automatically runs the program.

A More Sophisticated Program

That first program is less than impressive. Of course, if you've never run a compiler before, you may feel quite pleased with yourself, but we've only scratched the surface of this topic. Let's now look at a more complex program, which accepts some input (see Listing 2).

This program is a little more complex. Again, it starts with a comment, then there's a new statement: #define. All statements which start with a hash (or pound) symbol are instructions to the preprocessor, which runs before the compiler proper. In this case, it tells the preprocessor that wherever it sees the string NAMELEN, it should replace it with 40.

Thus the next line,

char name[NAMELEN];

actually appears to the compiler as:

char name[40];

This is particularly important. It means instead of having 'magic numbers' scattered throughout a program, we can define constants. If we want our program to handle longer or shorter names, we only have to change the #define line, rather than editing the entire program trying to decide if each 40 we come across is a reference to

---

Listing 1. *hello.c*
```
/* hello.c - the 'Hello World' program */
main()
{
        printf("Hello World\n");
}
```

Table 1: *Escape character pairs.*
```
b    = backspace
n    = newline character (linefeed)
t    = tab
"    = double quote (")
\    = backslash (\)
0nnn = any character specified by
       the octal number nnn.
```

Listing 2. *chat.c*
```
/* chat.c - sign on, ask user's name and echo it back in a message *
#define NAMELEN 40
char name[NAMELEN];
main()
{
        printf("\nHi there, what's your name?");
        gets(name,NAMELEN);
        printf("\nWell, %s, I hope I got your name right.",name);
}
*END:
```

```
Figure 1
A>CC B:HELLO
BD Software C Compiler v1.50 (part 1)
42 Kbytes elbowroom
BD Software C Compiler v1.50 (part 2)
38 Kbytes to spare
A>CLINK B:HELLO
BD Software C linker v1.50
Linkage complete
49 Kbytes left over
A>—
Computer Innovations Optimising C86 for CP/M-86:
1A>CC1 B:HELLO
cc1 preprocessor 2.20J 05-FEB-1985
Copyright (c)1981,82,83,84,85 Computer Innovations Inc, All rights reserved
1A>CC2 B:HELLO
cc2 parser 2.20J 05-FEB-1985
Copyright (c)1981,82,83,84,85 Computer Innovations Inc, All rights reserved
1A>CC3 B:HELLO
cc3 code generator 2.20J 05-FEB-1985
Copyright (c)1981,82,83,84,85 Computer Innovations Inc, All rights reserved
1A>CC4 B:HELLO
cc4 optimiser 2.20J 05-FEB-1985
Copyright (c)1983,84,85 Computer Innovations Inc, All rights reserved
1A>TED B:HELLO
ted 2.20J 05-FEB-1985 LINK-86 output
Copyright (C) 1984,85 Computer Innovations Inc., All rights reserved
1A>LINK86 B:HELLO.TED,C86SCS.L86[S,NOF,LO,LI,MAP]
```

```
LINK-86 Linkage Editor                                    Version 1.2

Serial No. 4007-0000-001224                          All Rights Reserved

Copyright (C) 1982,1983                             Digital Research, Inc.
```

```
CODE    02B1C
DATA    007D2
USE FACTOR:    05%
1A>—
```

```
Figure 2.
Computer Innovations Optimising C for MS-DOS:
C:cic>CC HELLO
(This runs a batch file which produces too much output to reproduce here, but
it's basically similar to the CP/M-86 version)
Microsoft C versions 1 & 2 (Lattice C)
C:mc>mc hello
C:mc>MC1 hello
Microsoft C Compiler (Phase 1) V1.04
Copyright (C) 1983 by Lattice, Inc./Lifeboat Associates
C:mc>MC2 hello
Microsoft C Compiler (Phase 2) V1.04
Copyright (C) 1983 by Lattice, Inc./Lifeboat Associates
Module size P=000E D=000E
C:mc>
C:mc>LINK C+HELLO,HELLO,,MC.LIB
Microsoft Object Linker V1.10
(C) Copyright 1981 by Microsoft Inc.
C:mc>—
```

name length or to age, weight, temperature or whatever.

The line 'char name[NAMELEN];' is actually a declaration (an instruction to the compiler to tell it certain things about a variable). A declaration defines certain attributes of a variable the compiler needs to know about. First its name — in this case its name is in fact 'name'; then its type — is it a character variable or is it numeric, and if the latter, what type of numeric variable? Thirdly, it defines its size, in the case of an array — in this case, we have an array of 40 characters, otherwise known as a string of length up to 40.

The declaration causes the compiler to reserve storage space for the variable in the program's data area. Finally, as we shall see later, it can also tell the compiler the particular storage class for a variable, which affects how the variable is stored and the instructions which access it.

For our immediate purposes, we can simply think of the declaration as creating a variable which we can then use in our program. In this case, we have created a variable called 'name', which can store a string up to 40 characters in length.

We now come to the program body proper. As you can see, it consists of three lines of code. The first and third are printf function calls, very similar to the one we've already seen.

The second line is a reference to the 'gets' function ('gets' stands for 'get string', and enables us to input a string from the keyboard). The function takes two arguments: the first is the variable which we are inputting to, and the second is the maximum number of characters to be input. 'Gets' will input up to NAMELEN-1 characters or until it sees a newline or end-of-file character in the input stream.

The next printf() function call looks a bit different from the previous one. This is because, for the first time, we're going to print a variable as part of the output. Let's look at the way printf works in more detail.

Printf

The printf function takes a variable number of arguments. The first argument is always a format string, which specifies how printf is to format what it outputs. The remaining arguments are the variables to be printed.

The format string generally consists mostly of plain text which will be printed exactly as it appears. However, two characters have special effects in the format string. One is the backslash escape character which we encountered earlier, while the

other is the per cent (%) escape character, which occupies the positions of each of the variables to be printed. A per cent sign signals the start of a conversion specification.

The end of the conversion specification is signalled by a conversion character, which specifies what format the output will take.

Between each per cent sign and its matching conversion character there can be several different types of information. Normally, printed output is right-justified; placing a minus sign in the conversion specification will force left-justification.

You can also specify a minimum width for the output field — any output will be printed in a field at least this wide, and wider if necessary. If the output doesn't fill the field width specified, it will be justified appropriately. If the minimum field width is specified with a leading zero, the justification will be made up with leading or trailing zeros, rather than spaces.

If the minimum field width is followed by a period and another number, this second number is taken to be either, for strings, the maximum field width beyond which output is truncated, or, in the case of floating point numbers, the number of characters after the decimal point.

The conversion specification can also include the letter l, which specifies the corresponding variable is a long rather than an integer (more on this next month).

Back to our sample program. The second printf() in chat.c, therefore, prints the specified string, with the contents of the variable name embedded in the middle of it.

Again, type the program into a file called chat.c and try compiling and running it. It will work fine for most compilers, although Microsoft/Lattice owners will encounter an oddity: the chat.c program will appear to execute the 'gets()' function before printing the preceding prompt, as though it has compiled the lines in the wrong order. The reason for this is the Lattice compiler buffers up its output and won't print anything until it sees a newline character. To fix the chat.c program, insert a newline (n) immediately before the closing double quote in the first printf() function call. This will fix the problem, although the program's output will not be quite as neat as for the other compilers.

You might like to try modifying the format conversion specification for the name and see what happens with various values and different names.

That first program is less than impressive. Of course, if you've never run a compiler before, you may feel quite pleased with yourself, but we've only scratched the surface of this topic. Let's now look at a more complex program, which accepts some input.

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Next month, we're going to progress to looking at variable types, declarations and arithmetic in C. □

Glossary

Conversion specification: A string present in the format string argument to printf() and related C functions, which specifies the format in which an argument will be printed (see Table 2).

Declaration: A statement required by certain programming languages, such as C, Pascal, PL/I subset G and others, which defines a variable before the variable is ever used. Because the declaration gives the compiler a lot of information about a variable, it's much better at error checking (particularly Pascal, but also some C compilers and the lint program).

Gets: A non-standard (non-Unix) extension to C, which is present in most compilers' libraries. It reads a string from the standard input (the keyboard).

Right-justified: Pushed across to the right side of a print field. For example:

this is left justified, while
                    this is right justified

Storage class: Variables can be created and stored in different ways in C, and these are called storage classes.
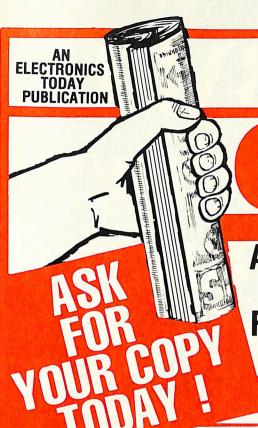
Type: All variables in C have a type. They can be character, integer, floating point and so on. □

Table 2: *Format conversion characters for printf, fprintf, sprintf.*
Conversion specifications take the form:
% [-] [[0] w] [.n] [l] <conversion character> where:

- (a preceding minus sign) forces left justification,
w represents the minimum field width, optionally preceded by a leading zero specifying padding with zeros instead of spaces,
n is the maximum width or precision,
l (letter l) indicates an optional long integer conversion, and the <conversion character> is one of the following:

d The argument is an integer, which is converted to a signed decimal value.
o The unsigned integer argument is converted to an octal value.
x The argument is an integer, which is converted to a hexadecimal value.
u The argument is an unsigned integer, which is converted to an unsigned decimal value.
c The argument is a single character.
s The argument is a string. If a maximum field width is specified, then at most that many characters will be printed.
e The argument is a floating point number which is output in scientific notation.
f The argument is a floating point number which is output without an exponent field in the form 'iiii.ffff'.
g Selects either conversion code 'e' or 'f', whichever produces the shorter output.

Non-standard Extensions:
Some compilers support non-standard extensions to these format conversion characters. In particular, %b indicates binary output formatting and upper case D, X, O, U and B indicate long formatting equivalents of ld, lx, lo, lu and lb respectively.

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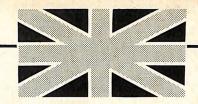
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DDB 4124 001

Business

LONDON CALLING

Don't let the chips get you down — Big Ben's still chiming, the low-end market's being given another chance and there's also a steady upward trend in the business sector. Norman Kemp takes a jolly good look at the British computer market, and finds plenty to be cheery about.

FOR SEVERAL Christmases past, British electronic stores seem to have had chips with everything — microchips, that is. Sales of home computers were booming and Britain led the world in ownership of hardware costing less than $600. "We thought it would never end," one retailer moaned when the collapse came with the winter of '84, producing the worst sales figures the trade had known. During 1985, while the leading Sinclair and Acorn brands nose-dived, some, such as Dragon, flickered and expired.

A browse through London's electronic shops during the Christmas season reveals just how grim the winter of '84 was: windows once crammed with computers and software are now filled with Japanese stereo portable radios and video recorders. A few computers, mainly Amstrads and Commodores, have been pushed into a corner, almost lost among cameras and other merchandise.

But behind the scenes optimism is riding high. All the major names experienced trouble during 1985, but have survived with the aid of rescue packages or amalgamations. Although there is less variety this year, large volumes will be available for the traditional seasonal trade, and last year will be looked back on as a regrettable aberration. Dragon, Oric, Lynx and a few others will not be in this year's line-up; the main starters will be Acorn, Sinclair, Commodore and Amstrad (a newcomer which is assembled in Korea).
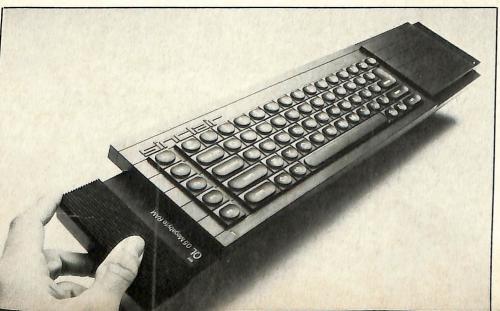
The Battle of the Boardroom

Generally, this hasn't been a year for innovation, with even the redoubtable Sir Clive Sinclair not adding significantly to his Spectrum QL after the speculative launch of his small electric car (which is still regarded as more of a novelty than a practical commercial venture). In fact, towards mid-year, Sinclair became embroiled in a boardroom battle to keep control of his company after it had been refloated with a large injection of outside capital. Sinclair is said to have produced a 128 Kbyte model of his Spectrum, but it's only selling in Spain, which is his largest overseas market. The QL price was halved recently, and there is little room between it and the earlier Spectrum for another model. It may be available elsewhere during 1986, but there's been no official announcement. ▶

Top: Amstrad's PCW 8256, *a personal computer word processing system which will retail in Britain for less than $1000.* **Centre:** *The Commodore Plus 4 pack — incredibly cheap at less than $200.* **Bottom:** *The Sinclair QL is going for half price.*

Perhaps a little nervous about the shakiness of the British market, the Japanese have not yet bombarded it with their MSX 8-bit computers, although some machines, notably the Sanyo 64 Kbyte and Panasonic 64 Kbyte (which retail for $195) and the more advanced JVC and Sony Hit Bit ($395), are on sale.

Another reason for the reticence of the Japanese may be concern about the feasibility of MSX, since a new MSX2 version which appeared recently is still being consumer-tested and has not been an outstanding success. Intended as a standard, it's not an operating system inside the computer, but a software-driven system provided with programs to enable about 16 different brands of computers to share the same games. None of the MSX brands has seriously challenged the recognised leaders among local manufacturers.

The Brit List

Announced in the late European summer, but not expected to be delivered in full volume until the pressure sales season is in full swing, is the Amstrad personal computer word processing system, which retails for less than $1000. Although conventional wisdom says home users don't require a word processor, Amstrad believes it has found a niche which can compete with electronic typewriters and offer additional computer data processing and graphics features (which have applications in small businesses).

The PCW 8256 has a generous 256 Kbytes of memory, a high-resolution monochrome screen of 90 columns by 32 lines of text, an 82-key keyboard with numeric pad for the proprietary word processing system (with commands similar to those of Wordstar), and function keys with pull-down menus. The operating system is CP/M Plus, which can run Digital Research Logo and GSX Graphics. The main memory can be expanded to 1 Mbyte, and the unit comes with a single 180 Kbyte formatted 8 cm disk drive, an automatic paper feed and a dot matrix printer, which provides near-letter-quality text at 20 characters a second and draft quality at 90 cps.

Although not claimed to be compatible with other machines, the PCW 8256 does provide Amstrad with an extension to the

CPC 464 which, with colour monitor, sells at just below $600. The 464 is mainly a cassette-driven games machine with 64 Kbytes of memory, and as an extra incentive Amstrad is offering it with $200 worth of entertainment, spelling and mathematics software.

In an aggressive pre-Christmas pitch, Commodore has dropped the price of its Plus 4 starter pack from around $500 to below $200. This machine offers a 60 Kbyte user memory, compared with 48 Kbytes for the Sinclair and Acorn, and includes a qwerty keyboard, data recorder, joystick and six programs. The 64 Kbyte Commodore has built-in word processing, database, spreadsheet and business graphics, a 175 Kbyte disk drive, full-size keyboard and printer for a total of $595 — a substantial drop from its previously listed price of nearly $1200!

Although original gift ideas are rare for 1985, there have been considerable developments in printers, disk drives and other peripherals, and many will be making their first in-store appearance this

Although original gift ideas are rare for 1985, there have been considerable developments in printers, disk drives and other peripherals, and many will be making their first in-store appearance this Christmas.

■

Christmas.

The sheer size of the British user base should continue to supply the low-end market for the rest of this decade, but the trend is for products to be directed more into business areas. This will inevitably mean a hike in prices, but computers will

be more efficient and software more readily available. It's quite likely enthusiasts will continue to write spreadsheet and word processing programs for such machines as the Spectrum, which is a considerable feat, but the expandability of low-end machines is limited and demand for them is levelling off. After 1985 there will probably be more stores selling business versions of the Apple II and Macintosh series and Commodore Amigas, Ataris and Apricots, which will all have the more advanced characteristics of professional-user machines.

But for Christmas 1985, while there might not be as many window displays in London centred around computers as in previous years, and some of those on display will be showing their age, the low-end market will be given another chance. Hopes are being bolstered by the publication of recent figures which revealed that around one million home personal computers will be sold this year; if this forecast proves realistic, maybe retailers will have a good Christmas, too. □

THE COMPATIBLES CAME IN
TWO BY TWO

Our ark is definitely listing under the weight of all these IBM compatibles, but in the hope of helping clone-seekers make an informed choice we'll continue taking IBM imitations on for inspection. Here, first mate Rose Vines appraises Sanyo's late arrivals.

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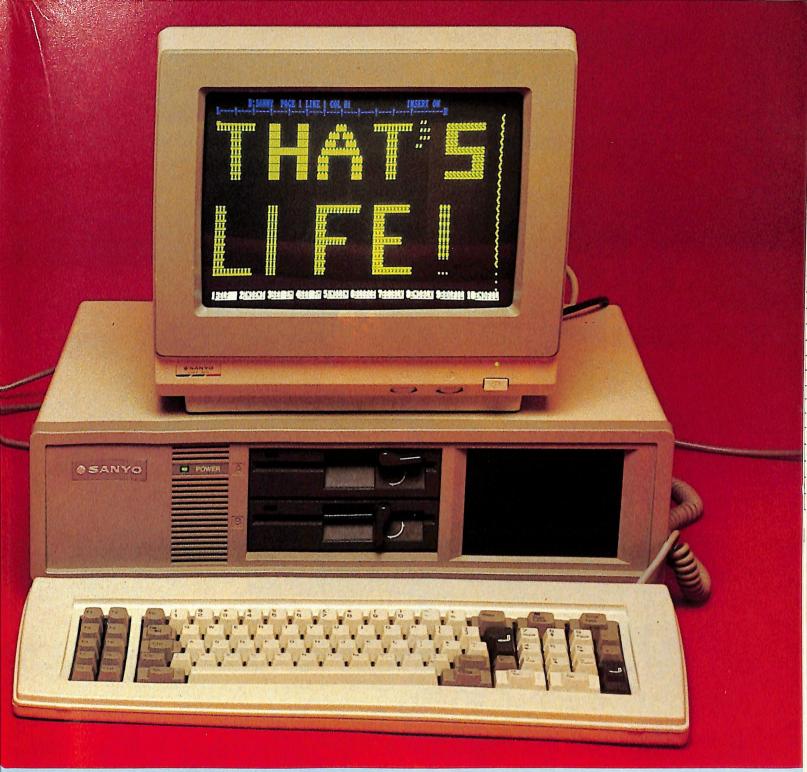
SANYO HAS TAKEN it's time in joining the ranks of the compatibility competitors. Now it has entered the arena with not one but two compatible machines — the MBC 670, a semi-portable, and the desktop MBC 880. While these machines don't offer any startling innovations or improvements over the IBM they mimic, both are solid boxes combining all the basics, plus a few extras, at a competitive price.

The Transportable
'Semi-portable' is definitely the term for the 670. The documentation and advertising brochures alternatively term it a "transportable", a "portable" and an "integrated compact desktop computer". Weighing 10.3 kg, it is as easy to lug around as our old Kaypro II; that's not saying much, but Sanyo is not trying to sell this machine on its portability, so I can't complain.

The company *does* try to sell the 670 on

its 'small footprint', which is pushing it; it may take up a little less room than an IBM PC, but the improvement isn't worth writing home about, and considering you get a small screen (17.8 cm diagonally) the tradeoff doesn't seem too good. The keyboard sits in front of the system unit and doesn't slot easily under it — a design feature which would have provided a little more room on the desk. Appearance is not this machine's best point.

While the screen is small it is easy to read, with standard IBM resolution of 640 by 200 pixels. I find resolution of this quality barely adequate for bulk word processing work, but as far as small screens go,

the Sanyo effort rates well. The readability is improved by the flatness of the screen — which means characters at the edges of the screen are as easy to read as those in the middle — and the non-reflective coating. I'd certainly prefer to read this screen than those of most other portable computers I've used. In fact, the size seems to disguise the pixels, and thus make it seem more legible than the standard IBM screen.

To the right of the screen is a floppy drive or two (two on the review machine) with 360 Kbyte capacity, a loudspeaker and keyboard connector — just about as simple as you can get. The keyboard is the 'improved' IBM-compatible standard, with

caps and num lock LEDs (light-emitting diodes) to show when you have those functions engaged, and the usual clacky feel to the keys.

At the rear of the machine are two expansion slots, a parallel and an RS232 serial port, RGB and composite video connectors, a brightness control for the screen (why not put it at the front?), an earth connector, an AC outlet and the on/off switch. There is also a nook for the power cord and a set of cooling vents.

Inside the Box

Getting inside the machine to replace or add expansion boards is done by removing ▶

The Black Douglas, aged for 8 years, to give you three extra years of maturity and quality.

All good things take time.

three screws and pulling the top cover back. The metal slot cover must also be removed when adding a board, which entails removing one more screw. From above the 670 looks quite different from the IBM, with the tops of the drives, screen and power supply obscuring the view of most other parts.

To get at the rest of the machine, which you will need to do if you want to boost the standard 256 Kbytes of RAM (you can build it to 640 Kbytes), you need to remove the top and back panels, disconnect the speaker, keyboard, video, power supply and floppy disk cables (long, skinny hands will help with this process), remove the bottom cover, the ground screw and the six screws connecting the main board, and finally remove the main board. Sounds like a tedious operation, and it is — one of the reasons why Sanyo suggests you leave it to your dealer.

If you do finally make it into the innards of the machine, you'll find, among other things, an Intel 8088/2 processor, with space for an 8087/2 maths coprocessor. The processor runs at 4.77 MHz, maintaining strict IBM compatibility.

The Soft Parts

Let's escape from the depths of the hardware and turn the machine on. The operating system supplied with the machine is MS-DOS 2.11, together with the ubiquitous GW-BASIC. Wordstar and Supercalc 3 are bundled with the machine, and although some may argue these are not the greatest programs on earth, they're certainly adequate for many jobs, and it's a pleasant change not to have to buy all software, including an operating system, on top of your hardware.

I tried all the old favourites on the 670 — dBase III, Flight Simulator and Lotus — and didn't have any problems. The documentation supplied with the system was ultra-concise, clear and well illustrated. I think beginners might hanker for a little more detail, especially in the BASIC section, but on the whole the manuals were above average.

The 670 retails for $2595, including sales tax and the bundled software. This places it in the cheaper end of the compatible market, and if you're looking for a computer which will sometimes need to be moved from work to home, the Sanyo Compact Desktop offers good value.

A Switchable Big Sister

Sanyo's second offering in the compatible market is the MBC 880 desktop model. This is fairly much a regulation IBM compatible, with a couple of bonuses thrown in.

The most interesting feature is a button at the back of the system unit which lets ▶

Machine:	Sanyo MBC 880
Manufacturer:	Sanyo Office Machines, Level 5, 5-9 Harbourview Crescent Milsons Point 2061; (02) 929 4644.
Standard configuration:	Monochrome monitor, 256 Kbyte RAM and one 360 Kbyte floppy disk drive; Wordstar and Supercalc 3 bundled with system.
Price:	$2795
Review unit from:	Sanyo Office Machines.
Worst points:	Holes in documentation.
Best points:	Value for money.

RATINGS: POOR GOOD V. GOOD EXCELLENT

DOCUMENTATION

EASE OF USE

DESIGN

RELIABILITY

VALUE FOR MONEY

you change the processor clock speed from 4.77 MHz (directly IBM compatible) to 8 MHz. Lots of software will function quite happily at the faster processing speed, while the slower speed provides complete compatibility. I'm not sure what novice users will make of this feature, as the manual says it exists, but doesn't even explain clock speed — not very useful at all.

The system comes with 256 Kbytes of RAM and one 13 cm floppy drive as standard, and there's room for a 10 Mbyte hard disk onboard (with the power supply already waiting). It has seven IBM-compatible expansion slots.

In most other ways the 880 resembles the Sanyo Compact Desktop, with a similar keyboard, good software compatibility and bundled software, all for $2795 including sales tax.

Sanyo has produced two machines which combine good compatibility, a couple of handy extras and low pricing. While neither machine is particularly exciting, they should both prove competitive in the current marketplace. □

Machine:	Sanyo MBC 670
Manufacturer:	Sanyo Office Machines, Level 5, 5-9 Harbourview Crescent Milsons Point 2061; (02) 929 4644.
Standard configuration:	Monochrome monitor, 256 Kbyte RAM and one 360 Kbyte floppy disk drive; Wordstar and Supercalc 3 bundled with system.
Price:	$2595
Review unit from:	Sanyo Office Machines.
Worst points:	Unimaginative design.
Best points:	Readable screen; price.

RATINGS: POOR   GOOD   V. GOOD   EXCELLENT

DOCUMENTATION	
EASE OF USE	
DESIGN	
RELIABILITY	
VALUE FOR MONEY	

LOTUS HOTLINE

Moves and News

Perhaps the most important news this month is Imagineering has moved, and the new phone numbers are (02) 662 4499 for general enquiries and (02) 663 5206 for the hotline. The hotline has had to expand and now employs three people.

The new 2.0 version of 1-2-3 was released in October. If you purchased 1-2-3 after August 1 you can upgrade for $45 by sending Imagineering your system disk and proof of purchase. If you purchased it before August 1 the update charge is $250. All updates are being handled by Imagineering rather than dealers, and the recommended retail price of Version 2.0 is the same as earlier versions: $835.

Version 2.0 of 1-2-3 is slightly larger than earlier versions, and a minimum of 256 Kbytes is recommended. It uses 'closed architecture', as opposed to the 'open architecture' of Symphony. This means 1-2-3 will never have more than the existing spreadsheet, database and graphics functions, while Symphony already has enhancements, such as a spelling checker and an outline processor.

Confusion

You may ask about the potential for confusion in a company using several different versions of 1-2-3. Imagineering expects mass upgrades in corporations, but I can't see this happening: many corporations will baulk at the cost and upgrade a single copy first, to see whether a mass upgrade is worthwhile. Incidentally, registered users of 1-2-3 will already have received details of Release 2 and the upgrade program.

I gather the 1.1 version of Symphony has a major programming error, but by the time you read this you should have received revised copies of the program and utility disks to fix the problem. These disks are free.

Macros

You may have seen some demonstration disks for an accounting program, CPA+. While slow in execution, this is an excellent example of 1-2-3 programming using macros. The macros in CPA+ have been written so they're difficult to read and to change.

More News

Imagineering has prepared a list of various add-ins and add-ons for 1-2-3 and Symphony, which is yours for the asking (it's already been sent to registered users).

Among these items is Symphony Link, which is used with an IRMA board and allows you to remain in Symphony while downloading files from a mainframe. A macro library manager comes with Symphony 1.1, which enables a macro to be password-protected. Another allows you to import files which have fields delimited by commas.

Report Writer for 1-2-3 costs $250 and allows you to choose AND/OR conditions in a database, as well as headings, notes and underlines. The finished report can be printed or displayed on the screen. You need 1-2-3 to create the database, but you can send the end result for use by someone who doesn't have 1-2-3. I haven't seen it, but it sounds good.

Lotus Graphics on IBM

Lotus has written the necessary print driver files to allow 1-2-3 graphics to be output on the Hewlett-Packard Laserjet. The file appears on a directory as: 'LOTUS.DLB 113077 2-04-85 1.08p'. I received my copy from our dealers without charge, although Imagineering appears to be offering the same thing, a 1-2-3 Printer Graphics Library Disk II, for $25.

Turn the Key and Away You Go!

I recently had the opportunity to examine a turnkey system written around 1-2-3. In computer jargon, a turnkey system is one designed for use by non-computer people and which is, in theory, so simple to operate you have only to turn a key (figuratively speaking) to use it. In practice, however, the situation is a little different.

No matter how good your turnkey system is, you need to cover a few basics for people who haven't used a computer before. I don't mean basics like how to switch the computer on or off; I mean such things as explaining the use of the four cursor keys and the PgUp and PgDn keys, and the relationship between the screen cursor in the worksheet and the one in the control panel.

A turnkey 1-2-3 system can have an auto-loading worksheet (AUTO123) and an auto-execute macro, 0, which enables you to go straight into a menu you've created. The system is laid out in the same way as the standard 1-2-3 and works in the same way — if you're able to give each menu choice different initial letters. The system I'm talking about uses this method, but it's written in two parts, by different people. Here the first difficulty surfaces: the user

interfaces and opening screens are quite different, although the two programs are designed to do much the same thing, so the user has to learn the differences between the two menu systems.

One system uses a full-page main menu in which each item is chosen by pressing Alt and one of the letter keys. After discovering one option is to go the main menu, where I thought I already was, I decided to give each menu a unique name and display it prominently from then on. (Incidentally, this program also gives you the choice of going to the master menu, which turns out to be the same thing as the main menu.)

When you use multiple menus in a large program you risk losing your way and being unable to proceed. One of the abovementioned systems solves the problem by arranging its menus in a logical order, using the same key combination to return to the previous step and always providing a Quit option on 1-2-3 control-panel menus. The other program doesn't do this, so you're virtually compelled to write the keystrokes down on paper to find your way around — not good.

1-2-3 limits you to a choice of eight menus, using the control panel. If you need more, you have to go to two tiers of menus. In one part of the menu system it's necessary to press <Esc>, and when trying to quit, part of the worksheet is often sent to the printer! The programmer put a note to that effect in the manual, which leads me to set out some computer rules:

1. Don't rely on people reading a manual: documentation is often a last resort.

2. Don't expect people to be logical and to press only the keys you want them to. Error trapping must provide for all possible keystrokes, expected or not.

3. A macro's execution can be stopped by pressing <Ctrl-Break>, so it may be desirable to trap this combination to prevent damage to a file, which could occur if a macro were inadvertently stopped in the middle.

Finally, the program in question uses printer setup strings, which have to be changed from time to time. After typing the normal command sequence /PPOS, the program erases the existing string when <Esc> is pressed and substitutes the new one. This works fine as long as there is a setup string to erase, but without one the macro will go haywire. The solution is simple: always add something (anything!) to the setup string before you erase it. □

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Public Domain

Software

Crunch
Software Corporation of Australia,
(03) 699 7255
Price: $445
Crunch is a spreadsheet for the 512 Kbyte Macintosh (with one disk drive). It is claimed to store more cells of data and to recalculate large models faster than any other spreadsheet currently on the market. Crunch uses a display of icons at the top of each screen to provide one-key access to frequently-used tasks. There is an in-built graphing facility, and graphs and spreadsheets can be displayed simultaneously. Data can also be sorted and queried, and extracts can be produced.

Disk of Letters
PB *Consultants,* (02) 389 1198
Price: About $40
This is the software version of a book by solicitor Peter Breen. He describes it as "a collection of the

letters I am most frequently asked to write for clients". It covers a wide spectrum of legal problems affecting both the individual and the small-business person. It provides form letters for dealing with debtors, employment, neighbours, government departments, tradespeople and a variety of other situations. The disk is fully indexed.

Foxbase
Cerebral Solutions, (02) 923 2288
Price: $695 for MS-DOS version
Called a 'dBase II compatible', Foxbase is claimed to run "between four and 40 times faster than dBase", using advanced B-Tree indexing to speed up file operations. It has 14-digit numeric precision, plus 8087 maths coprocessor support, 48 fields per record, twice the number of variables as dBase, command files compiled to tokenised code for speed and security, and a type-ahead buffer. Runtime versions are available, as are versions for

PC-Net, Multilink and PC-Slave.

Le'VZ D'base
Vsoftwarez, (07) 371 3707
Price: $98
A database for the 24 Kbyte VZ200 and 34 Kbyte VZ300 with disk drive. The database holds 99 records per file, with each record consisting of 10 lines of 29 characters. Searching can be done with or without an index, and mailing labels or reports can be printed. A 16-page booklet is included with the system, and Vsoftwarez will write special options for the system if required (at a negotiated price). Future versions of the product will include enhancements such as calculations and invoicing.

MacCOBOL
Computer Connection,
(02) 526 1404
Price: Around $795
The first COBOL language available for the Apple Macintosh, designed specifically for business applications. MacCOBOL provides access to 386 of the Macintosh's 512 ROM routines and features an editor, a compiler, a generating tool which compiles Micro Focus intermediate code into 68000 object code, a run tool which allows execution of multiple interdependent programs, a building tool which creates distributable modules and ISAM file handling.

Pagemaker
Software Corporation of Australia,
(03) 699 7255
Price: $895
Pagemaker is described as "a desktop publishing system" for the 512 Kbyte Macintosh computer. It will work with the Imagewriter printer, but is designed to be used with the Apple Laserwriter to produce almost typeset-quality print. Pagemaker allows easy design and production of newsletters, price lists, specification sheets and almost any document.

Powerbase Applications Series
Paxus Commercial Systems,
(02) 929 8844
Price: $150
Owners of the Powerbase database system can now buy applications templates, which provide

ready-to-run, modifiable systems. Some of the templates available are 'Membership Association Management System', 'Fixed Assets', 'Human Resource Management System' and 'Sales Prospect Tracking'. Paxus has already modified the original Powerbase templates to make them suitable for the Australian market.

Reflex — The Analyst Database
Software City, (02) 621 4242;
(02) 671 6951
Price: $159 introductory price
Reflex is a database which provides graphic representation of your data. Relationships can be shown using scatter, line, bar, stacked bar and pie graphs. There are five parts to the system: Form-view builds the database; List-view tabulates the data; Graph-view graphs it; Crosstabview charts links and relationships in the data; and Reportview allows you to import and export data to spreadsheets and databases, and prints reports. Windows let you see all the data forms at once.

The Financial Advisor
Commodore Business Machines,
(02) 427 4888
Price: $36
A cartridge program which allows calculation of costs and benefits of five common financial arrangements: periodic deposit accounts, periodic withdrawals, instalment loans, stocks and bonds. The four menus — for planning financial strategy, undertaking a current strategy, choosing one of nine compounding periods and undertaking transaction period calculations — can be accessed by typing a simple command into the computer.
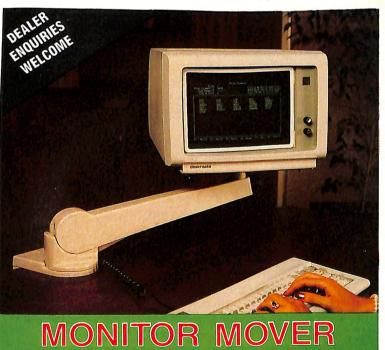
The Point Puer Database
Mitchell CAE (History Section),
Bathurst 2795.
Price: $8
For use on Apple II, IIe and IIc machines, this educational database has the criminal records of 118 male convicts of the 1830s and '40s in Tasmania. The 14 fields include date of birth, crime and place of trial, trade learned at Point Puer and year of release. The database is accompanied by

a 90-page handbook containing information on Point Puer, detailed instructions on the operation of the database, suggested research exercises and a collection of original documents.

The Small Business Accountant
ATS, (02) 872 4522
Price: $495
A fully integrated accounting package, SBA features automatic updating of debtors, creditors, stock and assets when changes are made to the general ledger; standing journal entries; automatic depreciation entries; and the ability to keep two months' accounts open concurrently. Stock levels may be controlled by following suggested re-order levels. Automatic entries adjust for stock discrepancies and also for profit or loss on resale of assets.

Xywrite II-plus
Kowhai Systems, (02) 546 6499
Price: $495
A full-function word processing package for the IBM PC, XT, AT and compatibles, Xywrite is suitable for most word processing needs — letters, memos, mass mailings, forms, articles and books. The program has a full set of functions for entering and editing text, flexible formatting and printer controls and keystroke programming capabilities.

New Machines

Alphatronic P50 and P60
Adler Business Machines, (02) 888 7644
A German IBM-compatible, the Alphatronic uses an Intel 80186 processor running at 6 MHz. It has a serial and a parallel port, four expansion slots, 640 by 400 pixel monochrome monitor and an ergonomic keyboard with separate cursor, numeric keypads and 18 programmable function keys. A variety of 'Easy Own' payment plans is available, allowing you to pay for the computer and software over a period of 24 months. The packages start from $268.41 per month.

Amstrad PCW 8256
AWA-*Thorn*, (02) 638 8444
Price: Around $1500
Included in the price are monitor, keyboard, printer and word processing software. Some of the features of the system are: 256 Kbytes of RAM; the CP/M Plus operating system, Mallard BASIC, DR Logo and GSX Graphics Extension; Locoscript word processing, offering simultaneous editing and printing, pagination, automatic paragraph realignment and cut-and-paste editing; high-resolution green-screen monitor; fully integrated printer with tractor and single-sheet feeding; and a built-in 8.5 cm disk drive.

Cleveland PC
Tomorrowland, (07) 397 2303
Price: From $1750 (excluding monitor).
The Cleveland PC/XT is an IBM-compatible manufactured by the Computer Corporation of Australia. It is supplied with PC-DOS 2.10, and is claimed to run all commercial IBM PC software. A major feature of the Plus models is double-capacity disk drives. The Cleveland drives have 720 Kbytes capacity while maintaining compatibility with the regular

IBM 360 Kbyte drives. Thus, you can load Lotus 1-2-3 on a regular floppy and then insert a 720 Kbyte disk for storing your data. The computer, monitor, keyboard and hard disks are covered by a twelve-month warranty, and the floppies are covered for three months. Systems available range from dual-floppy, 256 Kbyte RAM models to 20 Mbyte hard disk systems with 640 Kbytes of RAM.
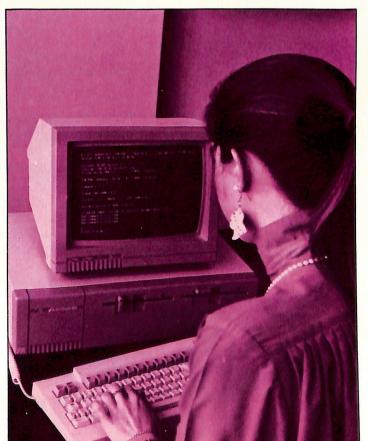
Clone PC
Computer Enterprises, (02) 419 8577; (03) 51 6785
Price: $1999
No prizes for guessing what it's a clone of! Claimed to be 99.9 per cent hardware-compatible and fully software-compatible with the IBM, the Clone comes in a variety of configurations, from the single disk drive, 128 Kbyte RAM, green monitor PC-1 to 20 Mbyte hard disk systems.

Portable PC
Ericsson, (03) 309 2244
Price: $5100 (excluding tax)
A lightweight portable PC with inbuilt 13 cm disk drive and MS-DOS operating system. The screen is a full-size flat plasma of 25 lines by 80 characters with a graphics resolution of 540 by 200 pixels. The PC comes with 256 Kbytes of RAM installed and is expandable to 512 Kbytes. Options include an inbuilt 300/1200 baud acoustic coupler, a large RAM disk, an inbuilt printer, a second disk drive and an external ▶

the advantages of IBM PC bus expansion and provides for the computing requirements of the everyday office environment in one piece of equipment, with financial modelling, word processing, project control, electronic mail, modelling and simulation, integrated software development and artificial intelligence.

Peripherals and Extensions

Acorn Supernet

Barson Computers, (03) 419 3033
Price: $500

PC/AT computers. The AT Disk hard disk system is available in 20 and 40 Mbyte models. It transfers data at five megabits per second, with an average seek time of 80 milliseconds, while AT Tape will back up 23 Mbytes of data in less than 20 minutes. Since it's file-oriented, the AT Tape allows restoration of files without disturbing data contained in other files. It uses the IBM floppy controller, so no extra controller is needed.

Brother M1509 Dot Matrix Printer

Brother dealers
Price: $799
A compact printer measuring 7.6 cm in height and weighing 6.7 kg. The draft speed is 180 characters per second and near-letter-quality text is printed at 45 cps. The MI509 has IBM/Epson compatibility, a 3 Kbyte buffer and an automatic paper-loading function.

Clip-on Board

Imagineering, (02) 662 4499
Price: Around $1800
An internal clip-on board which will boost the 512 Kbyte Apple Macintosh's memory to 2 Mbytes. The board is contiguous, so any memory-based software programs, such as Jazz, will be able to take advantage of the extra memory. Another advantage of the board is users will be able to use their Macintosh as either a 512 Kbyte or a 2 Mbyte machine.

Digi-pad L-Series Digitiser
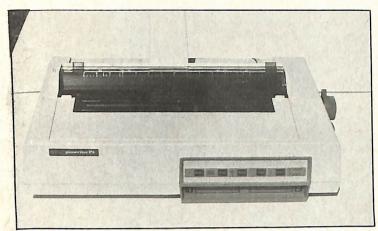
The TCG Group, (02) 699 8300
Price: Around $5000
Produced by the American company GTCO Corporation, the L-Series was created specifically to fill the gap for an AO-size digitiser in the personal computer CAD marketplace. It is compatible with a number of graphics programs, including Autocad, P-cad, Cad-plan and Versacad. The tablet is lightweight and easily moved, and can be mounted on a desk, draft table or wall. Resolution is 0.00254 centimetres and it can digitise through 2.5 centimetres of non-metallic material.

expansion box with two IBM-compatible expansion slots.

Robocad PC

Robocom, (03) 211 1881
Price: Around $3500
A PC for architects, engineers and draftspeople which allows the user to draw by manipulating a combination of screen icons, pull-down menus, a pictorial library index and an input device. Page-switching is no longer a problem: menus and palettes overlay the drawing, and amendments can be made with the press

of a button. The user is prompted through drawing routines and the system also allows a partial line erase and auto-dimensioning with metric/imperial unit conversion.

Whitechapel Workstation

The TCG Group, (02) 699 8300
Price: From under $20,000
A Unix-based personal graphics workstation incorporating 32-bit architecture, a high-resolution bit-map display, networking capability and a large memory capacity. The Whitechapel has

Supernet is a network bridge for Acorn and BBC networks. It enables networks to be extended beyond the previous 1.4 kilometre barrier, and still communicate at a full 190 Kbaud.

AT Tape and AT Disk

Alloy Computer Products,
(03) 529 8455
Price: $1595 (tape), $2195 (disk) — excluding tax.
Two half-height Winchester and tape backup systems which can be fitted internally into the second floppy drive cavity of IBM

Distributed Data Switch

Datacraft, (03) 726 9911
Price: $2080 for a five-port model
In its simplest form, the Data ▶

Switch will interconnect four dissimilar personal computers and a parallel device such as a laser printer. It will allow mainframes, minis, smart or dumb terminals and almost any RS232C device to communicate with each other. Similarly, 20- and 80-channel processors will interconnect 16 serial and four parallel or 64 serial and 16 parallel devices respectively. The Data Switch packets data and controls traffic over virtual circuits.

Easylan
Software Corporation of Australia,
(03) 699 7255
Price: $275 (excluding tax)
A low-cost network, Easylan consists of a 10 metre cable, RS232 serial connector and two floppy disks. Installation is simple and Easylan can be used with most IBM PC-compatible machines, allowing shared use of drives, printers and modems. Password security is available to protect files and up to 10 personal computers can be connected. Easylan lacks many of the advanced features of other networks, but provides most people's basic requirements for a fraction of the cost.

FX-85, FX-105
Epson, (02) 452 5222
Price: $760, $980 (ex tax)
These latest machines are intended to replace the FX 80 and FX 100. Each offers an 8 Kbyte buffer, and since Epson and IBM protocols are switch-selectable the printers can produce output from different software packages. The inbuilt word processing facility allows auto-justifying, word

wrap and an extra near-letter-quality Roman type font.

P5 Printer
NEC, (02) 428 1666
Price: $1765 (ex tax)
A high-speed letter-quality printer with 24-pin printhead, the P5 achieves 94 cps in letter-quality mode, and a speedy 264 cps for quick drafts. The P5 is a quiet machine, with a built-in print buffer of 8 Kbytes, which can be upgraded to 40 Kbytes in 16 Kbyte increments. This machine has 10, 12 and proportional pitch fonts, and others can be plugged directly into the printer.

Paperjet 400
Viva Computer Products,
(02) 908 4076
Price: $3770
The Paperjet 400 enhances the printer's performance by adding an additional two paper trays containing 350 sheets of paper, and 75 envelopes, without using additional desk space. When added to the Hewlett-Packard laser printer, the Paperjet 400 sets up and feeds paper and envelopes in any order automatically, then collates them into the output basket. It handles different types, weights and sizes of material, and the bottom-feed system allows full access to the printer.

Qume QVT 101
STC, (02) 925 7272
Price: $895 (excluding tax)
The QVT 101 is a low-cost smart terminal with full emulation of the Hazeltine 1500, Lear-Seigler ADM 3A/5 and Televideo 910 terminals. It has 16 programmable function keys, a 35.5 cm non-glare screen, bi-directional printer port, RS232 interface and a detached, low-profile keyboard. It incorporates block transmission.

Qume Sprint 11/40-130 Plus Printer
STC, (02) 925 7272
Price: $3595
This 40-character-per-second printer features a printwheel with one-third more characters than the usual daisywheel, allowing printing in over 10 languages. It can print in 10, 12 and 15-pitch with proportional spacing. Interchangeable interface modules make it compatible with almost any computer, and include a 14 Kbyte buffer. The Sprint 11 Plus Widetrack has these features, plus an extra-wide 53 cm carriage.
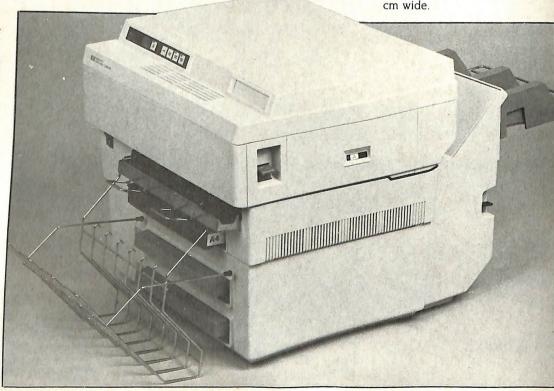
Qume Sprint 11/90 Plus
STC, (02) 925 7272
Price: $4995
A very high-speed daisywheel printer, the 11/90 Plus prints at 90 characters per second, and has an estimated 5500 hours mean time between failures (claimed to be one year longer than other letter-quality printers). Plug-in interfaces provide Centronics parallel, IBM PC parallel, Sprint 3 13-bit parallel and Wang Office Assistant connections. It has 10, 12 and 15-pitch printing, proportional spacing and takes paper up to 38 cm wide.

SDMB Colour Graphics Board
Insystems, (03) 690 2899
Price: $2000
This new card for the Cromemco is upwardly compatible with the existing SDMA. It provides a palette of 16 million colours (where do they all come from?). The number of colours that can be displayed simultaneously is limited only by the pixel resolution of the TV standard (365,904 for NTSC, higher for PAL). The new card, with the complete S-Series graphics system, is fully supported by a software library accessible from high-level languages, and by several powerful paint packages.

Seikosha BP 5420 A/I
Mitsui Computer, (02) 419 6199
Price: $1960
A quiet, high-performance dot matrix printer designed for large-volume printing, which features a cut-sheet feeder. It has a print speed of 420 cps in draft mode and 104 cps in correspondence-quality mode. The Seikosha has inbuilt graphics capabilities and can be connected to most micro systems, including the IBM PC. Its main feature is a built-in 18 Kbyte buffer, which enables the input of large amounts of data, even during printing. It handles paper widths of up to 40 centimetres.

Twinwriter 5
Brother dealers
Price: $1995

Claimed to be the world's first dual printer, the Twinriter 5 has daisywheel and dot matrix mechanisms. Daisywheel speed is 36 cps and the dot matrix output is 140 cps. It has a 132-column capacity, two types of ESC control and a sheetfeeder compatible with the Brother EM range of typewriters. Dot density can be adjusted to six different shades.

Ziyad Paperjet 2000
Viva Computer Products,
(02) 908 4076
Price: $6950
A letter-quality printer, twin-sheet and envelope feeder, two input trays and an acoustic hood — all in the one compact unit! Letters and forms are the main field of application, so the Ziyad is equipped with a multi-tray electronic sheetfeeder for the letterhead page, second page and envelope. It has a removable tray so printed correspondence can be carried from printer to desk, and the memory prints the name and address from the letter onto the accompanying envelope. All controls are on the outside of the acoustic hood for ease of access.

Ziyad Personal Sheet Feeder
Viva Computer Products,
(02) 908 4076
Price: $1200
A single-bin, platen-driven automatic sheetfeeder for light printing requirements. The feeder

weighs around 3 kg and has an adjustable paper guide and a manual override feed slot, which allows the user to insert odd-sized sheets, labels and envelopes directly into the printer. A single output bin holds printed sheets in the sequence in which they were printed.

Services

Hotline
Datascape, (02) 969 2699
Price: Free!
Datascape is extending its dealer network technical support centre and hotline service to users of Datascape products experiencing difficulties with interfacing and so on. The centre is in Mosman: instant support can be accessed through the hotline number (02) 969 2933.

Information Express
Information Express, (03) 209 2222
Price: $399 annual subscription

Information Express is a database for financially oriented users. Areas now covered include finance/investment, commodities, agriculture, news and weather. Other facilities include electronic mail and low-cost worldwide telex. The service operates 24 hours a day, seven days a week. Training and support are provided to all users. There is a once-only charge of $40 for the subscriber manual and the initial connection costs $86.

Mail-order Floppy Disks
Vercors Nominees, PO Box 126, *Wendouree 3355*
Price: $40 per library case of 10 by 13 cm floppies.
Vercors supplies double-sided, double-density, soft-sectored Nashua disks. If your order is accompanied by a cheque or money order, the disks will be sent postage free. Bankcard and Mastercard orders require a postage fee of $2 per box, to a maximum of $5. □

Your IBM

BY JOHN HEPWORTH

I REALLY can't believe just how careless some people are with their crucial, confidential files. Not only do few computer users carry out an effective backup routine, but some appear to go out of their way to let unfriendlies see information vital to their business.

What prompted these musings? A chance occurrence: an acquaintance rented a system which included a hard disk and, after booting up and doing a CHKDSK, found only 5 Mbytes of the 12 Mbyte disk were free. What was in the other 7 Mbytes? Not just proprietary program files from the last user, but highly confidential spreadsheets as well! He immediately erased all these files, but imagine the damage he could have caused had he been less ethical, or if he'd been a competitor!

At the very least, the first user should have erased all his files from the disk before returning it to the rental company. Even though erased files have all their original content intact until another file is written to the same part of the disk, and can be recovered by using programs like Norton Utilities or Ultra Utilities, few users would use unerase routines. Simple erasure of sensitive files is basic security.

If tighter security is required, all erased files should be overwritten to make it impossible to unerase them. Reformatting the disk overwrites all existing files on a disk, including those you might want to keep. WIPEFILE (one of the Norton Utilities) writes arbitrary characters over selected files. WIPEDISK (another Norton Utility) writes arbitrary characters over every file on a disk. A third method is to erase all files, then run a little program like the one below to fill all vacant file space on a disk with junk, then erase the junk file.

Such a program could be:

```
10 OPEN "JUNK.DOC" FOR OUTPUT AS #1
20 ON ERROR GOTO 50
30 PRINT #1,"THIS IS JUST JUNK TO FILL THE DISK"
40 GOTO 30
50 CLOSE: KILL "JUNK.DOC": SYSTEM
```

This will run until the disk is full, then kill the file it generated. It's slow, but how much do you value your business?

Programming Batch Files

With the introduction of DOS 2.xx, batch files were expanded into an effective programming language. The addition of input/output redirection (allowing a program which expects keyboard input to actually take that input from a file and/or send output to a file instead of sending it to the screen), makes chaining of some programs simple and powerful.

For example, each month I have to copy 50 to 100 disks of public domain software for the members of the Sydney PC User Group. To speed up formatting, copying and doing a CHKDSK on each disk I use a batch file which formats a disk in the B drive, copies all files from the A drive to the B drive, then does a CHKDSK on the disk in the B drive and finally loops back and does another disk. Each time a user response is required to a program prompt, it's taken from a data file. The batch file I use is:

```
echo off
echo  FORMCOPY.BAT
echo  Formats a disk in B drive,
echo  copies files from A: to B:
echo  Answers needed by FORMAT.COM
echo  are taken from FORMAT.DAT
echo :
GOTO PROMPT
:LOOP
format B: <format.dat
copy a:*.* B:
chkdsk b:
:PROMPT
echo Press [Control-C] to quit, else
echo to format and copy a disk,
echo place source disk in drive A
echo and target disk in the B drive and
echo on
pause
echo off
GOTO LOOP
```

The interesting part of this file is the line which says:

```
format B: <format.dat
```

The use of the left-angle bracket tells DOS to look into the file FORMAT.DAT for the answers to its prompts, and not to look at the keyboard. FORMAT.DAT is a simple file, consisting of two capital Ns, followed by a carriage return.

The other two important parts are the lines

```
:LOOP
GOTO LOOP
:PROMPT
GOTO PROMPT
```

DOS treats a line which commences with a colon as a label. A GOTO followed by the label name diverts DOS, which then executes the line of the batch file after the label. If the line containing the GOTO is the last line in the batch file it must be terminated with a carriage return, or the GOTO won't happen.

FORMCOPY.BAT and FORMAT.DAT should be in the same directory, and both FORMAT.COM and CHKDSK.COM should be either in the same directory or in one which can be found by a path.

Next month: nesting of batch files and interactive batch files. Merry Christmas!□

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High-quality games, utilities, educational and miscellaneous programs. Send SAE to Chris Groenhout, 25 Kerferd Street ,Watson 2602, for a list.
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The system includes the QL itself, the QL monitor, a printer, printer cable, the classic Adventure game and bundled software — all for $2,000. New condition. Phone Wilson (02) 808 3128 after 3 pm.
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Many interesting articles and programs. December issue — $2.

One-year's subscription (six issues) — $12. Write to Chris Groenhout, 25 Kerferd Street, Watson 2602.
Monitor
Pheonix-5 PAL/RGB colour monitor. As new. Suit Sega, Commodore orApple computers. $250 ono. Phone (02) 331 2872.
For Sale
A mouse for the Microbee, with 16,129 addressable points (127 x 127), fire button and software. It's easy to use under BASIC, and machine code. $60. Contact Wayne, 18 Bellbird Street, Canterbury 2193; (02) 78 8458.
Build an 8K to 256K Centronics Parallel Printer Buffer
Has single/multiple copy, Hex output mode, and ROM diagnostics to aid kit builders. Uses only Z80A, 8255, 2716, 74LS04 and dynamic RAMS. Instructions,
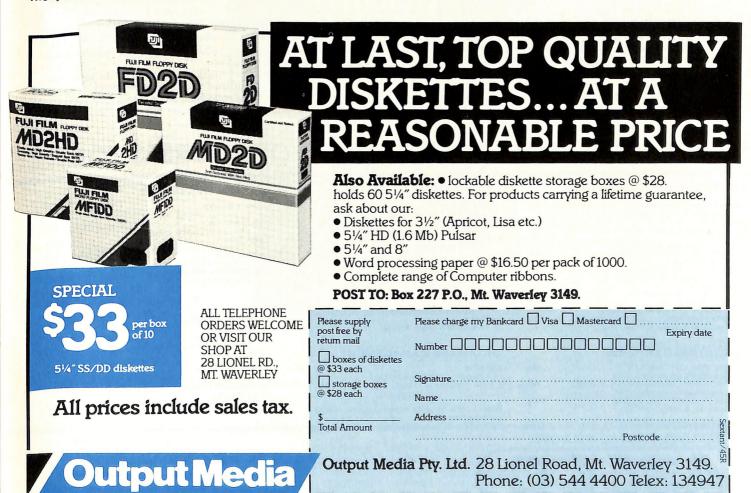
board and EPROM cost $39. For more information, send SAE to Don McKenzie, 29 Ellesmere Crescent, Tullamarine 3043.
For Sale
MicroBee Personal Communicator with 32 Kbytes, black-and-whitemonitor, cassette deck, cassette Assembler tutorial, ROM BASIC, Wordbee, Network, Edasm, all manuals and plenty of literature and programs. $529 ono. Contact C. Gronlund (02) 871 7582 ah.
For VZ200s and VZ300s
New disk-based database, Le/VZ D'Base V1.8, for $98. Also other quality software: educational and small business programs, games and machine language utilities. Send 23 cm by 10 cm SSAE for details to:Vsoftwarex, 39 Agnes Street, Toowong 4066; or phone (07) 371 3707.
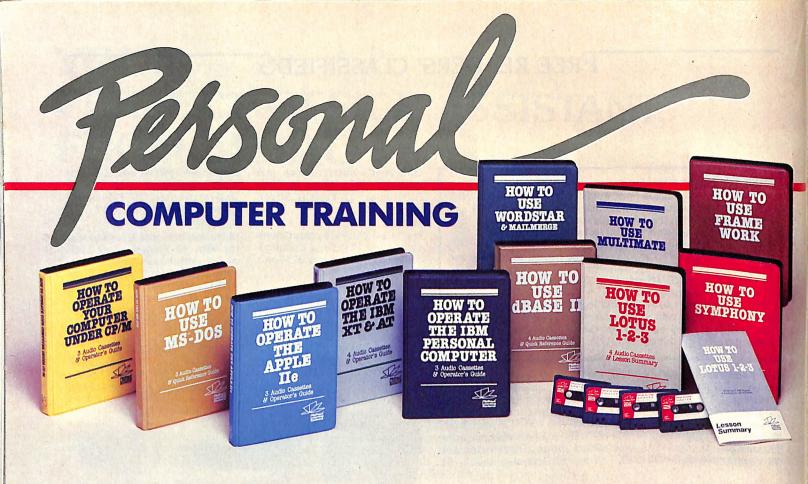
Through the Micro Maze – A Visual Guide to Telecommunications
Patrick Kincaid with Marlin Ouverson
Ashton-Tate, $9.95
This book is just what it claims to be — a visual guide to telecommunications! The layout is clear, with heaps of colour and simple diagrams. Each of the six chapters is colour-coded and prefaced with a neat statement of objectives, and key words are accentuated in bold type and included in a glossary at the back of the book. The authors' approach is practical and direct, and the book is clearly designed for use by the computer novice: "We offer a tool for your benefit ... Make notes, underline with reckless abandon ... ." The one-page buyer's guide is more a collection of shopping hints than a list of prices and addresses, but all in all, *Through the MicroMaze* is worth adding to your bookshelf.

Using Wordstar 2000 and 2000 Plus
David Barry, Rob Krumm
Prentice-Hall, $33.95
This book has a fairly standard, unexciting layout. Its 357 pages include a series of 'lessons' and an index, and authors David Barry and Rob Krumm maintain the teacher-to-student tone throughout by addressing the reader directly (spelling mistakes and all): "You've done quit (*sic*) a bit. Take a breather. You deserve it. We'll see you in lesson 3."
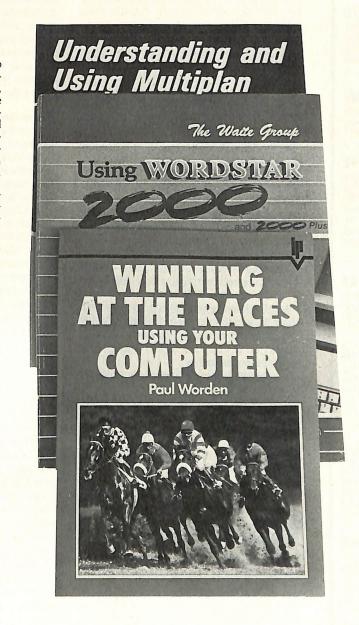
Winning At The Races Using Your Computer
Paul Worden
Pitman, $12.95
Has Mr Worden taken our name in vain? I'm afraid we at *Your Computer* have no magic formula for picking the ponies ...
Worden's book claims to "tell you several ways in which to make money by using your computer to help you select bets at the race track", and to this end presents a number of computer programs written in Microsoft BASIC. *Winning At The Races* is written specifically for Australian racing conditions, and although it's not about computers it does provide insight into how computerised number crunching can discover patterns to turn the odd unsuccessful fling into a winning scheme.

Learn Apple Writer IIe the Easy Way
Katie Layman and Adrienne G. Renner
Prentice-Hall, $33.95
A ring-bound book of explanations and specific directions for using the Apple Writer IIe word processing program functions. Each chapter provides step-by-step 'how to' directions and practice exercises.

Understanding and Using Multiplan
Rob Krumm
Prentice-Hall, $32.50
A thorough guide designed not to replace the Multiplan manual, but to help the user apply the information contained in the manual more effectively. This book is organised so each chapter covers a specific concept and shows examples of how that con-

cept is applied. It's not necessary to follow each chapter in strict sequence — a person with some computer experience could explore different areas of the book in the order he or she finds most interesting.

Data Processing for Business Studies
A. E. Innes
Macdonald & Evans, $14.95
In this introduction to data processing the author assumes no prior knowledge of the subject, but shows data processing in a broad context to widen its appeal to the more general reader as well as to business people and students in related fields. The book is divided into 18 chapters, each of which is preceded by a list of objectives and concluded with a series of 'self-assessment questions' and an assignment.

Research and Development in Expert Systems
M. A. Bramer
Cambridge University Press, $46.50
Comprised of papers presented at the Fourth Annual Conference of the British Computer Society Specialist Group on Expert Systems, this book looks at many aspects of current research and development in this field. Among the topics covered are expert system shells, reasoning and inference in diagnostic systems, the man-machine interface, the representation of knowledge, and knowledge elicitation and acquisition, together with discussions of various applications of such systems. In addition, the text of lectures given by invited speakers on natural language processing and on the representation of knowledge is provided.

Arcom Pacific
252 Abbotsford Road, Mayne 4006; (07) 52 9522.
Cambridge University Press
93 Albion Street, Surry Hills 2010; (02) 212 6014.
Pitman Publishing
158 Bouverie Street, Carlton; (03) 347 3055.
Prentice-Hall
7 Grosvenor Place, Brookvale 2100; (02) 939 1333. □

Your BBC

BY BRUCE MITCHELL

THE ADS SAY, "One finger and half a brain is all you need" to use 'The Music System' (an Island Logic product). It's not true: when using this program you often have to press CTRL and ESCAPE simultaneously, and although that doesn't require much intelligence you'd need a rather pointed nose to do it with less than two fingers. The "half a brain" claim is less of an exaggeration. Without some knowledge of music the other half would probably have to develop fairly quickly, but it's unlikely that anyone without an interest in music would be attracted to the package anyway. Here's the rub: it's also unlikely that anyone with musical expertise would find much satisfaction in The Music System in the long term. I'll explain the contradiction after describing the package because, whatever its usefulness, it is certainly a superb piece of programming.

Booting the disk brings a new kind of music to one's ears right from the start; what the disk protection system does to the drive head is something I'd rather not think about. The main control centre of the program appears after a screenful of warnings against copying, clearly superfluous after that overture.

The program has five sections: three are the musical equivalent of a word processor, a fourth is for putting it all together and the fifth turns the computer into a four-track recorder with keyboard control.

The editor is a great piece of software design. It is possible to compose (or, more probably, transcribe) up to four parts of a melody using a friendlier and more reliable approach than any other I've seen. All notes and rests can be entered using only five keys, with accidentals and changes of envelope and/or dynamics achieved with three others. My one gripe is you can only see one voice on the screen at a time, and though flipping between voices is as easy as pressing a function key, it isn't the same as seeing a triad all cosily huddled together. Bar lines can be inserted automatically if required, and repeats are handled with the greatest of ease.

Once entered and saved to disk any music can be treated with a great deal of disrespect. Altering the time signature, key and tempo is as simple as pressing the cursor keys. Using the linker section, a piece of music can be dovetailed into other files as often as required and in any order.

The result, of course, is only as good as the sound system it's played through. I suppose micros will eventually be fitted with a couple of Bose speakers as standard, but for now I've connected the Beeb's internal speaker wires to a switching socket mounted in the reset hole in the rear panel, and I listen to my compositions through a speaker rescued from a car radio. (The socket's also handy for earphones, so I can play 'Elite' after the family is sensibly in bed.) The larger speaker certainly improves the bass.

Epson-only Printout
Whatever your opinion of Epson printers (and mine is high), it's undeniable it helps if you have one when the time comes to use software that needs one (*the Queensland sun is really getting to him* — Ed). The Music System prints low-res or high-res manuscripts, but only on an Epson. Although the quality of the resulting printout is high, the sheets are hard to use on the average music stand since the staves run the length, rather than the customary width, of the paper.

My highest praise goes to the program's envelope-defining section. Way back in the early Eighties I tried to write a utility to make envelopes more manageable. I only had provisional documentation for my machine at the time, so the program had one or two (dozen) shortcomings; it was slow, inaccurate and complex. Island Logic's program is fast, accurate and complex. With the sensible use of icons and graphics, the module makes it possible to fool around with sounds in the most delightful way. Make no mistake, it takes time to master — simply because of the sheer complexity of the way in which the 14 envelope parameters interact. Once you have a sound you like it can be saved for use with the music editor section, or as a BASIC statement, or both.

Having said all that, why should I have reservations about the system? First, it must be asked whether it is enough for a piece of software to be superbly designed, debugged and proofed against all known forms of operator stupidity. In the long run, would the time spent learning to use The Music System, even with its excellent manual, be better spent practising a 'real' musical instrument, which, let's face it, has far more potential than even a brilliant piece of software like this? Perhaps when the MIDI interface becomes available the familiarity of a 'real' keyboard may make it all worthwhile.

The Music System retails for $79.99, and is distributed in Australia by Festival Records, 63 Miller Street, Pyrmont 2009; (02) 660 5218.   □

IBM UNDERGROUND

BY JOHN HEPWORTH

AS A PERSON who uses a computer to write, I'm very aware of some basic features which can speed up my work. For instance, with a computer I can take files in Wordstar format and convert them straight to ASCII, and vice versa. I can also count words in a file (which is important when trying to write to fit a space, or working out how much to charge on the invoice), and check my writing style.

Wordstar to ASCII and Back

One of the most common word processor programs in the microcomputer world is Wordstar, with versions for MS-DOS and CP/M machines of all flavours. Many, many documents are on various disks in Wordstar format. By contrast, most public domain software documentation is on files on disk in standard ASCII format with hard carriage returns and linefeeds at the end of each line.

Bill Bolton has written two file conversion programs and placed them in the public domain. Scrub takes a Wordstar file and turns it into a straight ASCII file, while Unscrub takes an ASCII file and prepares it for reformatting with Wordstar.

Just what is involved in this process, and how do these two programs do their job?

Each character in a file is represented in the computer as a number; the computer allows each character to have a value from 0 to 255. ASCII (the American Standard Code for Information Interchange) specifies the use of the numbers 0 to 127 only, and all alphabetic, numeric and other standard characters fall within this range. Wordstar adds 128 to the value of characters at the end of lines and to spaces used to pad out lines to equal length.

In binary terms, ASCII uses the seven bits of lowest value, with the eighth bit left as zero. Wordstar sets that eighth bit to '1' when marking the end of a word or inserting extra spaces for right justification, or inserting soft carriage returns at the end of a line.

Scrub A Dub Dub?

Converting a Wordstar file to ASCII is relatively simple: input each character and check if its value is 128 or higher. If it's higher, subtract 128 from the value of the character, then output the character, modified if necessary. In binary terms, each character is input, the high bit is checked, and if the high bit is '1' it's changed to a '0'.

The reverse path is a little more complicated — often in an ASCII file there's more

than one space between words, and the excess must be removed. The 'hard' carriage returns and linefeeds (decimal 13 and 10) must be changed to 'soft' carriage returns with values of 138 and 141. If more than one CR/LF pair immediately follows another they must be seen as a paragraph break, and left unchanged.

Running either program is done from DOS with a command line of the form:

Scrub sourcefile targetfile

or

Unscrub sourcefile targetfile

It's worth getting both programs — they're the sort of thing you'll use every day.

Word Count

Students writing essays, novelists writing books, journalists writing articles — what have they got in common? Almost all writing must be to a specified length, with space for 1000, 2000 or however many words pre-allocated before the writing begins. Again, most freelance writers are paid so much per thousand words, and must know the exact length of material to be submitted.

WC.EXE reads in a file, either ASCII or Wordstar, and counts the number of characters and words in it quickly, easily and accurately. I recommend it.

Fogging It Out

FOGFIN.COM is one of those programs which is fun to use and think about and runs successfully, but is based on a premise which is, at best, suspect.

FOGFIN reads in an ASCII file (see, if you use Wordstar you'll need Scrub to prepare a file for FOGFIN), and analyses its structure in terms of the Gunning Fog Index. By looking at the length of sentences and words an estimate of the age of reader able to understand the writing can be made. A fog index of 6 indicates a child in year 6 of primary school could probably read each word. TV guides normally have an index of 6, 'true confessions' magazines about 7, Readers Digest around 9, and the Wall Street Journal typically falls around 11. This column has a fog index of 10.4.

Fog index values above 12 suggest the style is suspect, and a rewrite might be a good idea. Unfortunately, a fog index below 12 doesn't indicate good writing — simple programs like this can only identify complicated writing. Why don't you try FOGFIN on your literary efforts, just for fun? □

How To Avoid Error Messages

The Microbee has a comprehensive error reporting system which can be a little cryptic for beginners, especially when the line in which the error is reported to occur is actually perfectly all right.

As an example, consider the following

```
00100 DIM A(4)
00110 FOR X = 1 TO 4
00120 A(X) = X * 2
00130 NEXT X
00140 A = 5
00150 PRINT A(1)
```

It would be reasonable to expect the value '2' to be printed on the screen, but instead you get an Illegal Variable error in line 150. In a short listing like this the error is easy to spot, as line 140 re-assigns variable 'A' as a non-array variable. But when this program occurs in a long listing it can take a long time to spot the problem.

There are hundreds of versions of the BASIC language in use, and Microworld BASIC, like most others, has its share of strengths and weaknesses. However, Microworld differs from other versions of BASIC by allowing both string and real variables to use the same variables, with some modifications to the pointers. Unlike most other versions of BASIC, it's not possible to use 'A1$' as a string and 'A1' as a real variable in the same piece of a program on the Microbee, so many programs written for other BASICs won't work.

For example:

```
00100 A0 = 4
00110 A0$ = "Microbees"
00120 PRINT A0,A0$
```

At first glance you'd think this would print 'Microbees' four times, but instead you get an Illegal Variable error in line 120. The problem here is real variables and string variables use the same letter and number system, so referring to 'A0' as a real number and a string in the same program is illegal.

The following is a variation on the above program, and has the same result:

```
00100 A0 = 4
00110 A0$ = "Microbees"
00120 A1 = 5
00130 A2 = A0 + A1
```

This will give the same Illegal Variable error in line 130.

A very puzzling result can occur when using the '+' function to add two strings together, as this time-response program will show. I often use this idea when I want a response within a certain time limit, which of course can be varied by changing

If you want a problem which will drive you crazy, add a comma at the end of a line of data statements. It's easily overlooked when you're checking the program, but BASIC won't forgive you!

■

the value of 'A'.

```
00100 REM answering in time
00110 A = 1000:REM time delay
00120 PRINT "Give me an Answer"
00130 Q0$ = KEY$:A = A-1:IF A > 0 AND
Q0$ = "" THEN 130
00140 IF A = 0 THEN 180
00150 PRINT Q0$;:A0$ = A0$ + Q0$
00160 IF ASC(Q0$) 13 THEN 130
00170 PRINT "Your answer was "A0$:GOTO
120
00180 PRINT "You are too slow":END
```

This stripped-down program (there's no provision for correcting errors) is handy if you want to convert the answer to all upper case in order to avoid parsing both upper and lower case responses. (Just add a line 145 which checks the ASCII value of 'Q0$' and subtracts 32 if it's over 96.) However, you'll get an Illegal Variable error in line 150, which can be puzzling, as line 150 is okay. The difficulty is easily fixed by adding one extra line: 00125 A0$ = "".

A problem which will drive you crazy occurs when you add a comma at the end of a line of data statements. It's easily overlooked when you're checking the program, but BASIC won't forgive you!

String arrays can cause many headaches for beginners, as Microworld BASIC won't allow any string manipulations of these using the simulated 'LEFT$', 'RIGHT$' or 'MID$' functions. You'll get a lot of 'unpaired bracket' errors before you give up. The solution is to let an unused string variable be equal to the string array and then work on this new non-array string.

Strings can also disappear if you use the SD function to speed up your response. This function affects the amount of vari-

able space allocated to each real (and therefore string) variable. The following program illustrates the problem:

```
00100 SD 4
00110 A1$ = "Microbee Strings"
00120 A2$ = "Hello there"
00130 print A1$,A2$
```

Think about this for a while before you try it and guess what will appear on the screen; it won't be what you expect! Where did that string go to? The short explanation is the SD function alters the number of bytes assigned to real variables. Five bytes is the default, but when strings are used you need four bytes to hold the pointer to the top of the string and the length of string byte. Using SD 4 limits the number of bytes to three, so the length of string byte is eliminated and what's in the memory following the string in use is a matter of chance.

For a more detailed explanation, refer to 'The Beeline', an article written by that quiet and helpful genius, Harry Purvis, way back in September 1983.

For my readers

As you may have noticed, the contents of these columns 'jump about' quite a bit: I do try to put down any information I can find. I also try to write about matters of interest to *Your Computer* readers, but I'd love you to let me know what you want.

I haven't attempted to go into great detail about what AT will do next, mostly because I don't have any real inside information and partly because AT always advertises its latest machines two or three months before they're actually available. There are constant rumours of a new 'small business' computer from AT which will *not* be called a Microbee and won't offer the upgradability which has been a feature of the Microbee range. The new machine supposedly has a detachable and larger keyboard with a separate numeric pad, as well as a completely memory-mapped display which doesn't run out of PCG characters.

I believe AT's strength lies in the hacker area, where the Microbee offers an affordable machine with limited technical back-up which is (just) acceptable to amateurs. I have only met one professional programmer who was trying to use a Microbee for business, but the results were so unreliable and the program (Sybiz) was so riddled with problems that the project was abandoned after three months.

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Your C64

AT THIS time of year a lot of people are competing for your dollar. Retailers estimate Christmas sales represent as much as 40 to 50 per cent of annual turnover, and computer dealers are no exception. With this in mind I've taken a look at some of the products we Commodore users will be finding in our local stores.

Software

There are two new releases from Activision, a company which made its reputation providing some of the better software for the now defunct Atari VCS. 'The Great American Road Race' is a reworked version of the highway driving theme. In this case you have four basic scenarios, each involving a race across America. You choose your route, your competitors and starting time (when driving at night the cars display tail lights). When racing, you must keep an eye on your fuel, watch out for police radar traps and use the gears to get maximum speed without blowing the engine. The graphics are very similar to those in Pitstop, but with more scenery changes. The Great American Road Race costs $34.95 on disk or $19.95 on cassette.

Also from Activision is 'Tour de France', a game meant to capture the excitement of the epic French bicycle race. As in the real thing, 'Tour de France' is conducted in sections (or *etapes*), but the computer game allows a practice mode (*entrainement*) and the option of only competing over selected sections of the course. It's a game requiring at least two players, with each rider competing to score the fastest time per section. Activision isn't joking when it describes it as a "sports endurance" game; the only way to make your bicycle go fast is to pedal, which you do by constantly jiggling the joystick or the keyboard pedal keys.

The game has good graphics and plays a mean 'Marseillaise', but if you were hoping to represent Australia, you can't; only American and European contenders are allowed! On the positive side, you don't have to ride past any French nuclear testing sites — they're all out here in the Pacific! Tour de France is available only on cassette, and costs $19.95.

Imagineering has also entered the Christmas fray, with four specially bundled software game packs for $29.95. Pack one is a cartridge pack and includes Choplifter and Lode Runner. Packs two and three are cassette only, combining River Raid, Pitfall II and Hero; or Ghost Busters, Pitfall I and

Beachhead. Pack four, the only disk pack, contains Beachhead and Pitfall II. Considering all these titles still sell individually for $19.95, Imagineering's Christmas packs do represent real value.

If you like strategy games, the Strategic Studies Group has issued an updated version of the classic 'Reach for the Stars' ($45). The new release retains all the style and playability of the original, and adds new features, such as an option for advanced computer players, which is a real challenge.

The latest release from SSG is 'Europe Ablaze' ($50). This is a recreation of the air battles over Europe in World War II, and really looks like a masterpiece. You can play it solitaire or in teams, and can directly command all or some of your units; or you can play Commander-in-Chief and set the strategy, letting your computer subordinates worry about the details.

The game is historically accurate, with remarkable attention to detail; playing it gives real insight into the problems and challenges both sides faced in the actual battles. Europe Ablaze has three scenarios, ranging from the Battle of Britain to the air war over Germany. It also has a game design kit, which allows you to create scenarios. Because SSG is an Australian company, its products are actually cheaper here than they are in the United States — a nice change!

Hardware

Access software has released its Mach 5 disk enhancement cartridge. It comes with a disk containing a directory organiser and a program which gives you an extra 4 Kbytes of RAM from BASIC. Mach 5 is claimed to be completely transparent and is said to make your 1541 go up to five

times faster. "Up to" is the operative phrase: the speed increase only applies to large program files. Programs such as Easyscript, which use relative files as part of their protection, seem to load only marginally faster (in 60 seconds as opposed to 65 without it), yet all my own programs (stored as standard PRG program files) showed a dramatic increase in load speed. The claimed complete transparency is true to a point; 95 per cent of the programs seem to load okay (including Superbase, Flight Simulator and Easyscript), but I've found programs which manipulate or replace the 64's kernel won't (PAL, Carriers at War and Reach for the Stars are three examples which don't run correctly with Mach 5).

At $50, Mach 5 is cheaper than other 'fast load' systems, and includes an enhanced wedge (allowing easy disk and screen dump commands), but unless you're using self-written programs or public domain software, I'm not convinced it represents value.

Books

You've probably noticed information is the hardest thing to come by in the computer world. Apart from the oasis at *Your Computer*, another spring of clear and concise knowledge is the American magazine *Computer Gazette*. It's Commodore-specific, but at around $7 an issue it's a little expensive.

The same publishing house puts out a series of books, which are excellent value at between $20 and $30. I can particularly recommend *Mapping the Commodore 64*, by Sheldon Leemon. It's well written, coherent and, more importantly, it's accurate. Short of a ROM disassembly, it contains almost everything you'd ever want to know about the C64, including short demo programs. Other books in the series specialise in sound and graphics, and you can find them at computer dealers or in the computer sections of most bookshops.

Of course, the best place to go for information is your local computer club. These are non-profit organisations created by fellow Commodore users. You'll usually find objective advice, plus hints and tips. *Your Computer* regularly publishes contact lists of user groups. Some groups publish magazines which you can subscribe to, even if you're not in their area; the Sydney-based SYDCOM (GPO Box 1542, Sydney 2001) is one example, publishing a bi-monthly magazine called *Peripheral*, which costs $9 for six issues (post paid). □

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Your APPLETOSH

BY ANNETTE BROWN AND DARREN CHALLIS

Updating and Upgrading Your Apple II

This month I want to talk about some exciting new hardware additions to the Apple II family, including a number of boards and some new disk drives.

The Accelerator IIe from Titan Industries increases the speed of the IIe three-and-a-half times, so a game such as Rail West (from Strategic Simulations) which would usually take four to five hours to complete, can be played in two to three hours without losing any of the excitement.

The Accelerator IIe has a 65C02 microprocessor clocked at 3.5 MHz, with 80 Kbytes of RAM on the card — 64 Kbytes to replace the 64 Kbytes normally on board, and 16 Kbytes for ROM. When the Apple is turned on, the ROM is copied into the 16 Kbytes of RAM set aside for it on the card, so the clock speed of the Apple II or IIe is bypassed.

If you have an Apple II, the card is put into slot 0, replacing the 16 Kbyte card you may have there. In the IIe it can go into any slot, including slot 3 (although with the Euro Apples sold in Australia — and if you have an 80-column card — this slot will already be taken).

The Accelerator won't speed up CP/M software and isn't compatible with Corvus disk drives or with the Saturn 32 Kbyte RAM card. However, if you're using the Apple for business programming with standard Apple software, the Accelerator is a must, as it considerably increases the processing power of your machine.

Go for a Fast Drive

It won't, of course, increase the speed of disk access. To achieve this you'll need to purchase the Unidisk 3.5, which Apple has just released. This is an 800 Kbyte drive using the 9 cm format available on the Macintosh. This drive provides access times three times faster than the Unidisk 5.25 (the replacement for the Disk II). Hopefully the announcement of this drive will herald the introduction of an 800 Kbyte drive for the Macintosh: Apple said it would do this when the reliability of the 800 Kbyte drive was proven; this must now be the case, otherwise why introduce it on the Apple II?

Although the drive will be supported on the Apple II and Apple IIe, to run the drive on the IIc you'll need to have a new 128 Kbyte ROM installed. This installation will require the cutting of a jumper at a point near the new monitor ROM, and the

soldering of a jumper near the MMU chip. The upgrade will not be available until late this month or early next month and you'll have to get your dealer to do it.

Interestingly, the new ROM will have the hooks to connect the IIc to Appletalk — not the full implementation of Appletalk, but the potential to be connected.

The IIc's ROM will be intelligent enough to recognise what type of drive is connected to the external drive port. If it is a 9 cm drive, it allocates this drive to the phantom slot 5. By using system utilities with two daisy-chained 9 cm drives and a 13 cm external drive, you get the following:

Slot 6, Drive 1 — Internal Drive
Slot 6, Drive 2 — 13 cm Drive
Slot 5, Drive 1 — 9 cm Drive
Slot 5, Drive 2 — 9 cm Drive

Even though the external 13 cm is the last drive on the daisychain, the IIc will default to the 9 cm drive on boot-up if there is no disk in the internal drive. On the IIc, you will need to boot from slot 5 — the recommended default slot for the UniDisk 3.5.

If you're a Pascal lover, you will need a new Pascal — version 1.3 — which should be out by the time you read this.

The only limitation of the drive is that it is PRODOS only; it will not support DOS 3.3. This may change if some third party vendor writes a patch for DOS to recognise the drive — now there's a money-making idea! The cost of the Apple drive for the IIe is $695 (including tax).

The DOS 3.3 option *is* available on another 9 cm drive, produced by Interlink of Melbourne. The Interlink drive has 320 Kbytes of storage space under PRODOS, DOS 3.3, and CP/M. While it doesn't have the looks of the Unidisk, it's more functional. The timing of its release is unfortunate, as it will have to compete against the Apple standard. I have not been able to test its compatibility or the speed difference, but hope to get a chance in the future. If you are interested in getting a 9 cm drive, I suggest you have a look at this one.

Odds and Sods

Coinciding with the release of the 9 cm drive is the appearance of a program called 'MouseDesk'. This package was developed by Versionsoft, the company that produced 'MouseCalc', and 'MouseWord' (both promoted in the United States by Steve Wozniak). The package gives the Ap-

ple IIe a Macintosh-like Finder. When seen at a distance on a black-and-white monitor, it is hard to tell the difference between the two systems.

Another exciting development comes from a United States company called Checkmate Technology, which is producing a board that will give you a 65C816 16-bit microprocessor. Developed by Western Design Centre, this is the chip rumoured to be used in the yet-to-be-released 16-bit Apple IIc.

The board is installed by placing the unit into the MMU (memory management unit) socket, and putting the MMU chip onto the add-on board. The board is then connected by a cable to the rest of the unit and plugged into the existing socket (Slot 3). There will also be a version of this board for the Apple IIc.

Another exciting card is the Swyftcard, developed by Jeff Raskin (one of the original designers of the Macintosh). The card is a ROM-based system which plugs into the Apple II, providing a word processor, database and terminal package. It will retail in the United States for around $90.

The latest hardware add-on I've heard of for the Apple IIs is a locally-produced product from Interlink. A card to support the full colours of Viatel on the Apple II, it bypasses the Apple's video circuitry and generates its own graphics in 16 colours. It comes with 16 Kbytes of RAM, and supports RGB, NTSC or PAL video standards. The software supplied with the unit uses the Super serial card to communicate with a 1200/75 baud modem.

Hot Tips

By now most Mac users have the 'New Finder' (version 4.1), and will be aware that the control to quit MacWrite is passed to the Minifinder, rather than to the Finder itself. There is one way to stop this: by holding down the option key straight after quitting, the MiniFinder is avoided and you end up at the Finder. This undocumented feature always works, except at startup!

Another useful undocumented feature of Finder 4.1 is associated with the 'Clean Up' command. If you hold down the option key and select Clean Up from the special menu, the icons will not only be tidied up, but will also be moved to the top left-hand corner of the window. Note this only happens to icons which aren't already in a proper Clean Up niche; if you do an ordinary Clean Up followed by an Option-Clean Up, nothing new will happen. □

market directory

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your computer

GREASE OUR PALMS

With coconut oil ... they'll want a suntan, too. The-swaying-in-the-tropical-breeze-style palms, of course — we warned you months ago, we're off to an island. The staff of *Your Computer* is planning an escape during the pre-Christmas silly season.

Maybe it'll be during the Christmas party, maybe not — whenever the Federal Publishing security guards can be caught 'off-guard' we're going to pack our oars and rubber dinghies, blacken our faces, slink down the back stairs, snip the barbed wire with our cable-making side-cutters, and make a break for it.

If we can dodge the bullets and put off the dogs (we'll confuse their little noses by spraying floppykleen all over the ground) we'll head straight for the Rosebery stormwater drain, launch the dinghies, crack a bottle of France's bubbliest (lemonade, of course), and paddle like hell till we reach the sea. From there it's north to paradise ...

We're never coming back. Until they catch us, anyway. But just in case the barbed wire proves too much (we did recommend lightweight side-cutters for cable-making, silly us) we've planned a special January issue. Besides, we want *them* to think we're working busily on January right up until we go over the wall.

So what's special about the plans for January? Well, it's going to be bigger than any previous January YC, and better too. It will be the *Your Computer Yearbook*. We thought about doing the Yearbook as a separate magazine, as we have done in the past, but that only lasted a short while — we reckon you're just as bored as we are with new/different/extra/me-too computer magazines, so we decided not to add one more to the pile.

A bumper holiday issue had to be a better idea, we decided. If nothing else, it will give us something to roll up and hit the guards on the head with should we get away late.

January — sorry, the Yearbook — will feature the grand finale of the *Great Database Search*. We'll have four more database packages under the YC *microscope*, including Q-Pro 4 (which has only recently been released in Australia), and TAS (The Accounting Solution). We also hope to have an update on one of our favourites, Knowledgeman (there's a Kman II sitting in Customs right now — if we can brave their queues and get some service we'll have it in time).

We'll also summarise the findings of the search. After more than a year of reviewing database packages, we're ready to declare a winner in our quest for the ultimate dBase II replacement. We haven't tried every database on the market, but it's time we closed the search and made our choice — so get the Yearbook (sorry, January) if you want to find out exactly how the major database packages on the market rate against each other.

We have a bumper lineup of reviews and features for January (would you believe the Yearbook?). For starters, Les begins his latest series — a special *Beginners' Guide to Microcomputing*. If you're just starting out (or if you have a friend you want to help into the micro world) this one shouldn't be missed.

Then we have Dick Smith's low-cost high-quality IBM lookalike, the *Multitech* (starting price is $1300), a *Sony Word Processor* (what *is* the difference between a word processor and a micro, anyway?), a comparison of disk transfer systems for the IBM (*Xenocopy*, PC-*Alien*, and *Media Master*) and a comparison of *Laser Printers*. The latter is far from guaranteed, however, because every manufacturer contacted has promised a machine for review, yet so far *none* has delivered. We've waited more than two months for most of them, but keep getting 'it'll be there on Tuesday' style promises. What are they trying to hide?

If it wasn't for Logo Computer Centre, a Hewlett-Packard dealer, we still wouldn't have discovered the delights of laser printing at all. Rather than wait for the 'ours is better — you'll see' crowd, we bought the Laserjet. We love it.

Cartoonist *Brendan Akhurst* says he has a treat in store for us — a story compiled by mixing paragraphs from the YC past. Those of you who know well the warps of his mind will be dying to read it,

WHO ARE WE KIDDING?

Should we really go on? Can we fool you into believing we'll produce February and March issues instead of basking in the sun at our island? Well, just in case we can't resist the lure of computing (or the guard catches us and throws us into a cell in straitjackets, or we run out of money and have to come back, or ...) we'll tell you what we have planned.

February will host a special feature on *Microbee Systems*, the new name for Applied Technology. Longtime readers will recall that the Bee was launched with a 32-page insert in YC's February 1982 issue: the fourth anniversary of that significant occasion will see the announcement of a whole new range of Microbees. Owen Hill will be back from Russia (where he was discussing the sale of *Cagey Bees*, and *Nyetworks*) to talk to us, and he promises to show us some 'interesting new developments'. We'll review several Bee packages, such as *Bee Artistic*, and look at some of the more interesting uses for the machine.

March will attempt to uncover the *best buys* on the Australian market. We'll be looking at all machines, regardless of release date, so it will be an interesting comparison with the finalists for *Personal Computer Of The Year*.

If you own an Apple IIc, you'd have to add all this

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